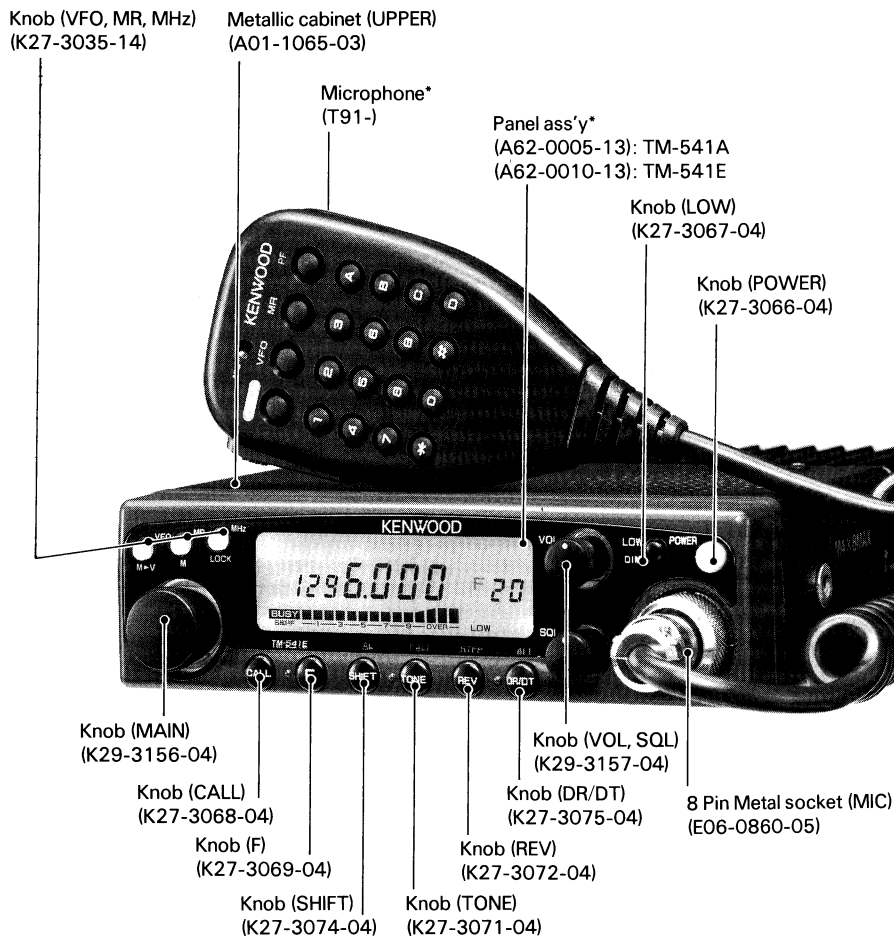


TM-541A/E

SERVICE MANUAL

KENWOOD
Bryan Fields, W9CR

©1990-9 PRINTED IN JAPAN
 B51-8063-00(B)699



* Refer to parts list on page 15.

CONTENTS

CIRCUIT DESCRIPTION	2
DESCRIPTION OF COMPONENTS	11
PARTS LIST	15
EXPLODED VIEW	28
PACKING	29
ADJUSTMENT	30
PC BOARD VIEWS/CIRCUIT DIAGRAM	
LCD ASS'Y (B38-0330-05)	34
APC (X59-3130-00)	35
MIC AMP (X59-3610-00)	35
ALT (X59-3510-00)	36
PLL (X58-3490-11).....	37
TX-RX UNIT (X57-371X-XX)	39

SCHEMATIC DIAGRAM	41
TERMINAL FUNCTIONS	45
BLOCK DIAGRAM	46
LEVEL DIAGRAM	48
DRU-1 (DIGITAL RECORDING UNIT)	49
DRU-1 (SCHEMATIC DIAGRAM)	54
DTU-2 (DTMF UNIT)	56
MC-44E (MULTI FUNCTION MICROPHONE)	58
MC-44 DM/MC-44 DME (MULTI FUNCTION MICROPHONE WITH AUTOPATCH)	59
MC-44 (MULTI FUNCTION MICROPHONE) .	60
TSU-6 (CTCSS UNIT)	61
SPECIFICATIONS	BACK COVER

Manual Scan

I hope this service manual is of use to you. Kenwood does not make this available as a PDF and all other available copies are of poor quality.

Each page is captured at 600 DPI, and as 24-bit color, 8-bit grayscale or black and white and at the proper page size, up to 11x34 inches in many cases. OCR has been performed on the document, even on the large pages. The document is condensed into one single PDF with text overlay. You should be able to print the larger sheets on 11x17 or tile them onto 8.5x11 if needed.

Please do not charge for access to this, or put it on a pay-wall site. Please don't pay for access to any such sites, they are against the ethos of hacking, and it only encourages them to profit off the hard work of others which has been shared openly. Please don't change this/recompress it; this defeats the point of capturing this at high resolution.

If something is incorrect here, or unreadable please reach out; I likely have the original lossless compressed images. In the final PDF that's color or grayscale will be JPEG 2000 format with highest quality selected. B&W images will be compressed using CCITT Group 4. This is quite close to the source material, but there may be some artifacts due to lossy compression. If there's a choice between file size and image quality, image quality will win. It's 2021 and storage and bandwidth is cheap.

This was captured on a Canon DR-G2140 scanner which is a ~7500 USD unit circa 2021. You may note some artifacts and lines in on the scans, these are due to scratches on the sensor glass, and are minor. The replacement glass is about 250 USD if you're feeling generous :-)

If you have a hard to find/out of print manual and would like to make it available please reach out, I may be able to scan and return it to you.

Thank you,

Bryan Fields, W9CR
bryan@bryanfields.net

CIRCUIT DESCRIPTION

MODEL	TM-541A	TM-541E
Unit Name		
TX-RX Unit	X57-3710-11	X57-3712-71

Table 1

Frequency Configuration

The TM-541A/E utilizes a PLL synthesizer system and digital VFO. The VFO is capable of tuning in 10 kHz, 12.5 kHz, 20 kHz, and 25 kHz steps.

The receiver system configuration is based upon double super-heterodyne principles with a first intermediate frequency (IF) of 59.7 MHz and a second intermediate frequency of 455 kHz. The transmit signal generated by the PLL (Phase Locked Loop) circuit, oscillating at one half the fundamental frequency is directly modulated, amplified and applied to the antenna.

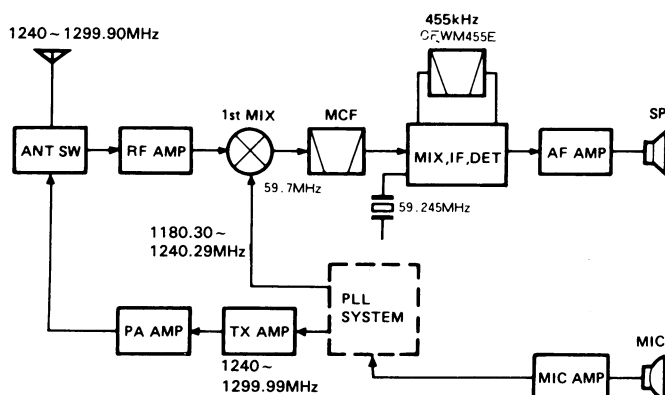


Fig. 1 Frequency configuration diagram

Receiver System

• General

Incoming signals from the antenna pass through a low pass filter circuit in the transmitters final stage, then through the transmit/receive switching diodes, and then to the front end of the receiver.

The incoming signals are amplified by a microwave GaAs (Gallium Arsenide) FET and enter a two-pole helical resonator. The signals are then passed through an additional microwave GaAs FET and two-pole helical resonator in order to remove any remaining undesirable components. The signal is then applied to the first mixer. The front end of this transceiver is matched thru the use of a microstrip line in order to obtain high sensitivity and reliability. The first mixer employs a GaAs FET that provides excellent two-signal characteristics. The incoming signal is combined with the first local oscillator signal from the PLL unit and converted into the first IF signal of 59.7 MHz. Undesirable harmonics are removed from the IF signal by a two stage MCF (Monolithic Crystal Filter).

The first IF signal is amplified and applied to the FM IF HIC (IC2: KCD04). The incoming IF signal is mixed with the second local oscillator frequency (59.245 MHz) to obtain the second IF frequency of 455 kHz. This signal is then applied to a six element ceramic filter (CFWM455E) to sharpen the signal quality and fed back into IC2 for additional amplification. The output signal from the IC2 is then fed into a power amplifier via the audio volume control for application to the speaker.

• S-Meter Circuit

S-meter control voltage from IC2 (KCD04) in the FM IF HIC is fed into the control circuit. The CPU converts the voltage from an analog to a digital signal in order to operate the LCD bar meter.

Item	Standard
Center Frequency	59.700 MHz
Passband width	± 12.5 kHz or more at 3 dB
Attenuation bandwidth	± 35 kHz or less at 25 dB ± 100 kHz or less at 60 dB
Guaranteed attenuation	70 dB or more within $F_o \pm 1$ MHz 80 dB at $F_o \pm (890 \sim 930)$ kHz
Spurious	40 dB or more within $F_o \sim F_o + 500$ kHz
Ripple	2 dB or less. Minimum loss 4 dB or less
Impedance	Input/output 560 ohms $\pm 5\%$ Input/output 1.5 pF ± 0.1 pF

Table 2 MCF (L71-0280-05) characteristics (TX-RX unit L5)

Item	Standard
Nominal center frequency	455 kHz
6 dB bandwidth	± 75 kHz or more (at 455 kHz)
50 dB bandwidth	± 15 kHz or less (at 455 kHz)
Ripple (within $455 \pm \text{kHz}$)	3 dB or less
Insertion loss (at the maximum output point)	6 dB or less
Guaranteed attenuation (within 455 ± 100 kHz)	35 dB or more
Input/Output matching impedance	1.5 k Ω

Table 3 Ceramic filter CFWM455E (L72-0366-05) Characteristics (TX-RX unit CF1)

CIRCUIT DESCRIPTION

Transmitter System

• Outline

The basic configuration of the transmitter section is that of an oscillator circuit operating at 1/2 the desired operating frequency is directly modulated by using a varactor diode. This signal is then doubled, amplified and applied to the antenna circuits.

• Modulation Circuit

Voice signals from the microphone enter the transmitter via three op amps. These operational amplifiers perform pre-emphasis, amplification, limiting, and includes a splatter filter, which is used to reduce undesirable high-frequency components from the signal. A portion of the incoming audio signal is taken from the output of the amplifier and is applied to the microphone check circuit that is used in the low power setting of the radio. The FM modulation circuit applies this signal directly to the VCO via a varactor diode.

• PreAmplifier Circuit

The output signal from the VCO enters the pre-amplifier (HIC). The value of this circuit is that it provides high quality signal amplification since it is always operating in its linear range.

• Final Amplifier Circuit

The signals from the pre-amplifier stage and DRIVE HIC: KCB07 enter the final module where they are boosted to the desired final output level. This transceiver uses a large heat sink to prevent failure of the final amplifier due to temperature. It is designed to provide efficient radiation of the heat generated by the final amplifier.

• APC Circuit (Automatic Power Control)

The automatic power control circuit (APC) uses a diode to detect a portion of the output from the final module. It amplifies this signal and uses it as a control voltage. This control voltage is inversely proportional to the output so that a constant output is produced.

Item	Symbol	Tc (%)	Unit	Condition	Rating
Operating Voltage	Vcc	25	V		17
Base bias voltage	Vbb	25	V		10
Current Consumption	Icc	25	A		8
Input voltage	Pin	25	W	Z _G = Z _L = 50 Ω, V _{cc} = 12.5 V, V _{bb} = 9 V	2
Output power	Po	25	W	Z _G = Z _L = 50 Ω	25
Operating case temperature	Tc(op)		°C		-30 ~ +110
Preservation temperature	Tstg		°C		-40 ~ +110

Table 4 Power module M67711, maximum rating (Final Unit IC401)

CIRCUIT DESCRIPTION

• Antenna Switching Circuit

The antenna switching circuit is shown in **Fig. 2**. The receive circuit consists of a two stage cutoff circuit that is formed by 1/4 wavelength striplines which provide low insertion loss and good isolation.

A PIN diode is used as a switching element because of its small junction capacitance, and because its high frequency capacitance is relatively independent of reverse bias voltages.

Fig. 3 shows the equivalent circuit for the transmit section. The switching diodes are forward biased whenever the 8T (8 volts on transmit) is active. During transmit, the apparent impedance felt on the two 1/4 wavelength strip lines is very high (Point A) which prevents power from being coupled into the receiver section. This ensures maximum power is transferred to the antenna and protects the receiver front end from possible overloading.

The equivalent circuit for receive is shown in **Fig. 4**.

During receive the 8T line is held low which causes the PIN diodes to be reverse biased. This presents a high impedance to the incoming receive signals, effectively blocking them from the transmit section. The two 1/4 wavelength striplines present a low impedance to the small signal levels of the incoming receive signal and allow the signals to pass along to the receiver circuits.

In practice the junction capacitance of the PIN diodes will never reach zero so that the impedance of one circuit (Z_{out}) might influence the other, to a small extent. Diodes are provided to reduce this junction capacitance, and thus the effect of this interaction between circuits.

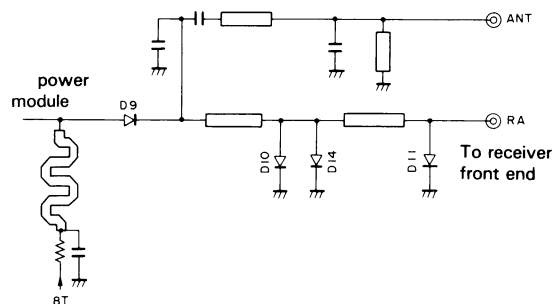


Fig. 2 Antenna Switching Circuit

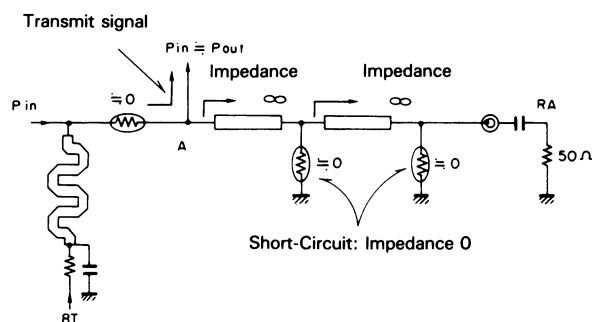


Fig. 3 Equivalent circuit for transmit

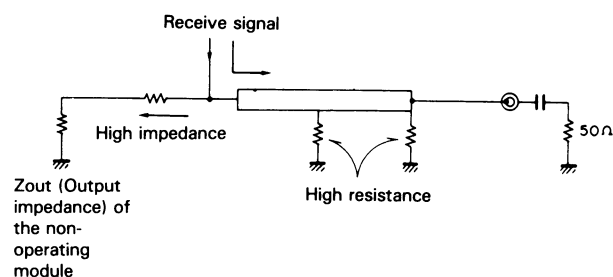


Fig. 4 Equivalent circuit for receive

CIRCUIT DESCRIPTION

PLL Synthesizer Unit

A block diagram of the PLL unit is provided in **Fig. 5**. The PLL unit of the TM-541A/E is constructed so that the VCO unit is contained in a separate shielded case that forms its own subassembly. This technique results in improved electrical and mechanical stability, which increases the overall frequency stability of the radio.

The VCO oscillates at a frequency of 600 MHz. Its second harmonic (1200 MHz) is amplified by transistor Q2 in order to obtain a useable 1200 MHz signal. This signal is then amplified by Q54. Here the signal is divided by 128 or 129. The resulting signal is applied to the phase comparator (MB1501PF) to obtain the correction voltage that is used to lock the VCO on frequency. A TCXO (Temperature Compensated Crystal Oscillator) reference oscillator operates at 12.8 MHz which helps to reduce frequency drift and offers high stability.

A frequency of 10 or 12.5 kHz is used to compare the signal obtained by dividing the 12.8 MHz TCXO frequency by 1/1280 or 1/1024 in order to provide the various tuning steps of 10, 12.5, 20, and 25 kHz.

The relationship between the fvco (RX) and the various division ratios is explained below:

- $fvco (RX) = fRX - 59.7 = \{(n \times 128) + A\} \times fosc \div R$
- $fvco (RX)$: The output frequency (Q2 output) of the VCO during receive
- fRX : Receive frequency
- n : Set value of the binary 10 bit programmable counter

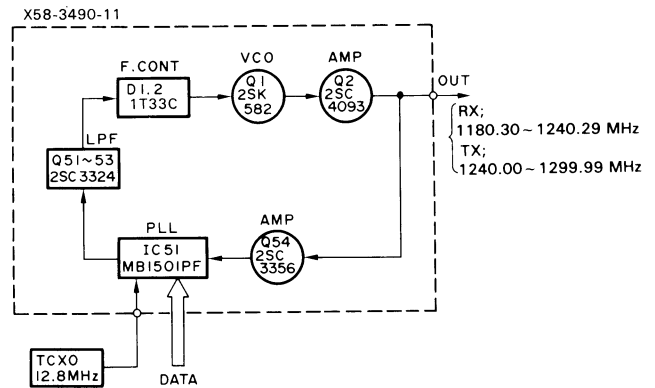


Fig. 5 Block diagram of the PLL unit

- $fosc$: Standard Oscillator Frequency 12.8 MHz (TCXO)
- R : Set value of the binary 14-bit programmable reference counter
- 1024 (for the 12.5 and 25 kHz steps)
- 1280 (for the 10 and 20 kHz steps)

In the case of 1260 MHz,

$$\begin{aligned} \bullet \text{ } fvco (RX) &= 1260 - 59.7 \\ &= \{(n \times 128) + A\} \times 12800 \div 1280 \\ &= 1200.300 \text{ MHz} \end{aligned}$$

where $n = 937$ and $A = 94$.

For transmitting,

$$\begin{aligned} \bullet \text{ } fvco (TX) &= 1260 = \{(n \times 128) + A\} \times 12800 \div 1280 \\ &= 1260.000 \text{ MHz} \end{aligned}$$

where $n = 984$ and $A = 48$.

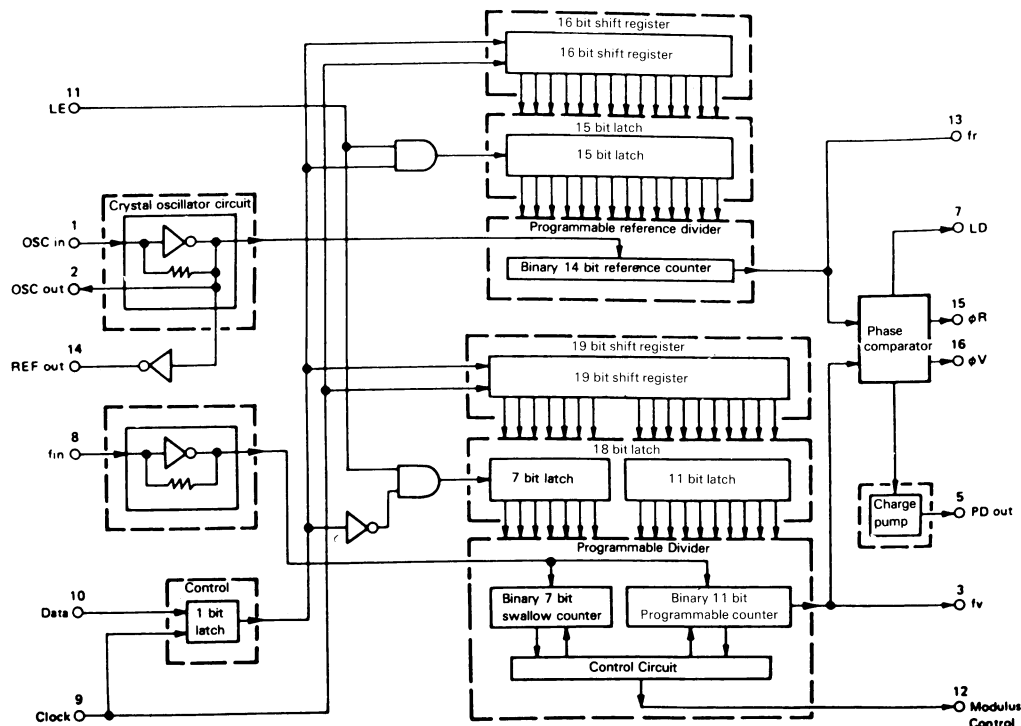


Fig. 6 Block diagram of MB1501PF (VCO unit IC 51)

CIRCUIT DESCRIPTION

• ALT (Automatic Frequency Locked Tuning) Circuit

The block diagram of the ALT unit is shown in **Fig. 7**.

The ALT system uses a portion of the second local oscillator signal, mixer, and the FM IF HIC: KCD04 module to form a feed-back circuit that is used to provide analog automatic frequency control.

When the first IF (59.7 MHz) changes due to a shift in the transmitter frequency a corresponding shift will occur in the second intermediate frequency. A portion of this second IF signal is detected. This correction voltage is amplified (NJM4558M) and is used to control D1 and D2 via analog switch MN4066BS. TP1 can be used to check the value of this control voltage. D1 and D2 are in series with the 59.245 MHz oscillator circuit and provide voltage control of this oscillator (VCXO, Voltage controlled oscillator). Therefore, fluctuations of the second IF cause a corresponding change in the second local oscillator circuit, which keeps the frequency of the second IF within the bandwidth of the IF filter. This system main-

tains close agreement between the transmit and receive frequency bandwidths. (In practice, the receiver frequency and transmit frequency are automatically maintained in close agreement.) The center voltage of the vari-cap diode is set by a voltage divider circuit. Stability of this voltage is maintained by a voltage follower circuit. When the ALT circuit is off, the control voltage applied to the vari-cap diode is switched to this fixed voltage divider circuit in order to set the second local oscillator frequency.

The control voltage for the vari-cap diode is subject to one additional voltage divider stage. During receive this DC signal is applied from the RM line to the microprocessor terminal PTH02 which turns on the tuning indicator light. Switching is performed by the 8R line.

The relationship between the input voltage on the PTH02 terminal and the tuning indicator, and the relationship between the RM voltage and the deviation during receive is shown in **Table 5** and **Fig. 8**.

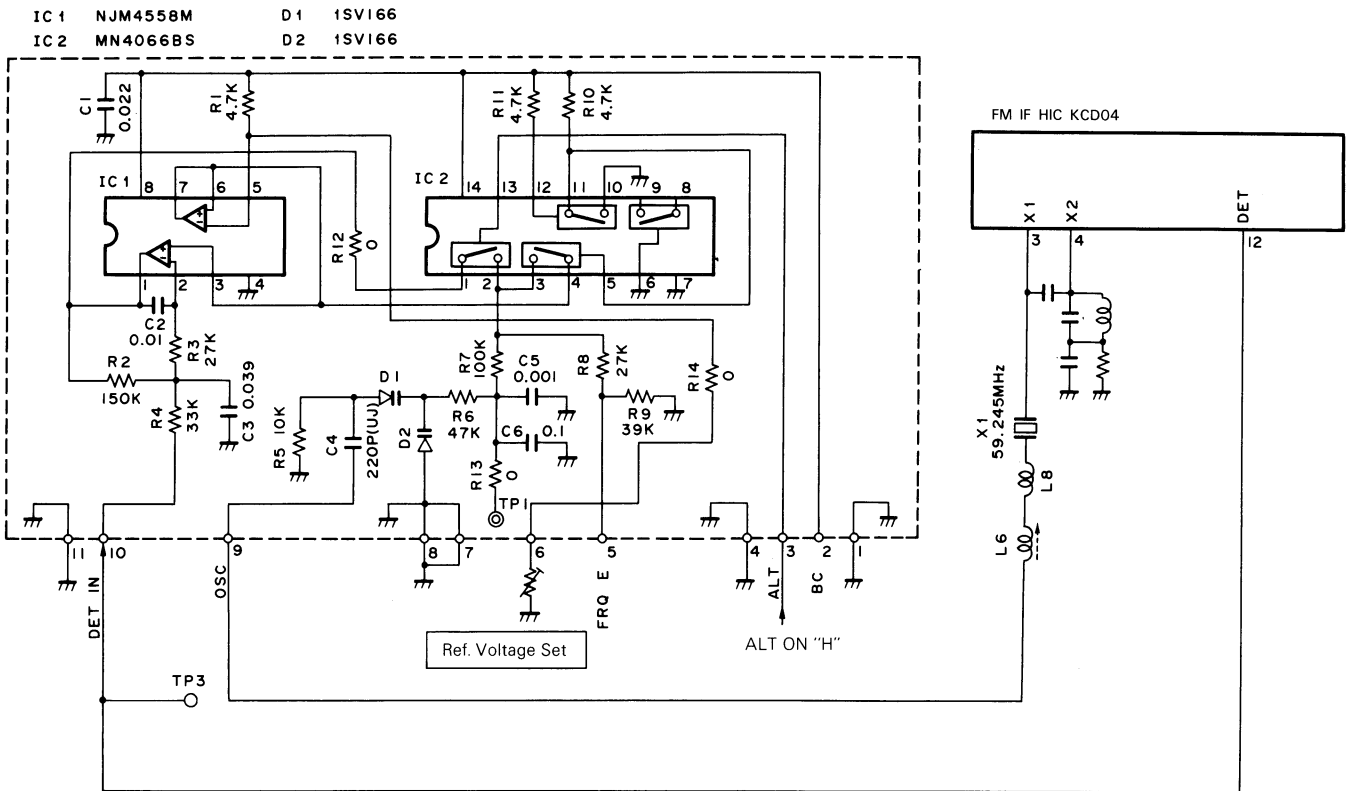


Fig. 7 Block diagram of the ALT unit

PTH02 input voltage	ALT indicator
0 ~ 1.48 V	Only ◁ turns ON
1.48 ~ 2.79 V	Both ◁ and ▷ turn OFF
2.79 ~ 5.0 V	Only ▷ turns ON

Table 5 Relationship between PTH02 input voltage and the T indicator

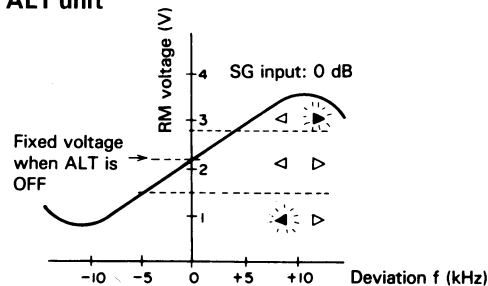


Fig. 8 Relationship between the RM voltage and deviation during receive

CIRCUIT DESCRIPTION

• Unlock circuit

When the PLL is unlocked, the base of Q16 is off with OV, turning Q16 off: As a result, the collector of Q16 becomes 8 V. This turns Q16 off and Q14 on, then turns Q12 off. Therefore, when the PLL is unlocked, Q12 is off removing bias voltage from the 8T line. Without the 8T voltage no transmit signal is generated.

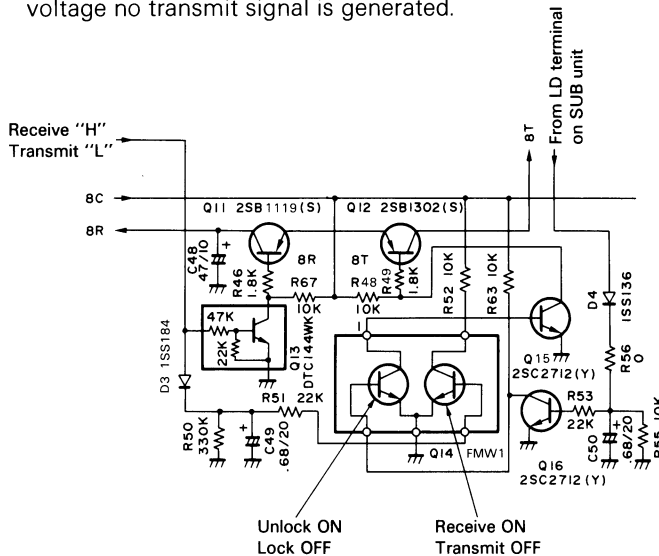


Fig. 9 Unlock circuit

Digital Control Unit

• Overview

The digital control unit consists of a several keys, a rotary encoder input, a display, a reset circuit, a back-up circuit, and a tone output circuit. These circuits are controlled by a single microcomputer (CPU).

• Key and rotary encoder input circuits

The keys on the panel are arranged in matrix. Key input is fed into the CPU, using a key scan technique. Output from the rotary encoder is fed directly into the CPU.

• Microphone key input circuit

The UP, DOWN, and other function keys of the microphone are directly connected to their corresponding analog input pins of the CPU. Each of the functions is activated by a voltage generated when the corresponding key is pressed.

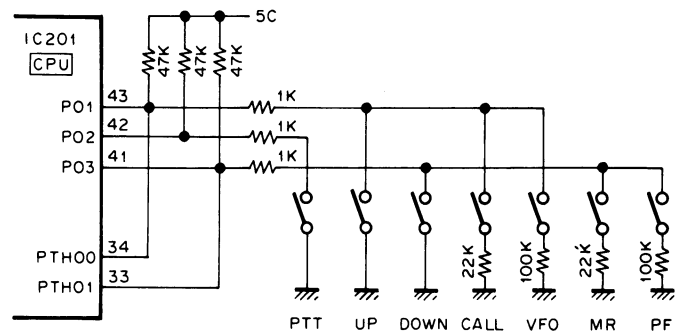


Fig. 10 Microphone key input circuit

CIRCUIT DESCRIPTION

• Reset and back-up circuits

When the TM-541A/E power is turned on, the reset circuit sends a "L" level pulse to the RESET pin of the CPU for approx. 3ms. This initiates the power-on reset sequence.

When the TM-541A/E power is turned off, the backup circuit detects a voltage drop in the 5C line and sets CPU INT4 to a "H" level. This causes the CPU to enter a back-up state.

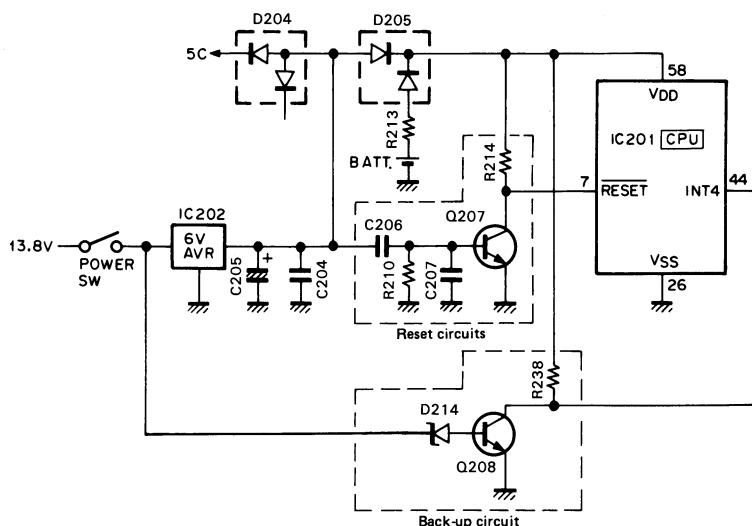


Fig. 11 Reset and back-up circuits

• Shift register circuit

The shift register circuit consists of IC5 (TC9174F). The IC5 receives serial data from the microcomputer to perform the controls listed below.

Pin No.	Pin name	Function
1	GND	
2	ALT	Usually "L"
3	B1	Usually "L"
4	CE	Electronic VOL select: "H" when electronic VOL selected, "L" when panel VOL selected or interface connected.
5	VOLD	Electronic VOL DOWN: "L" when DOWN key ON.
6	VOLU	Electronic VOL UP: "L" when UP key ON.
7	MUTE	AF MUTE: "H" when TX mode, AL 1ch receive mode, CTCSS, bell, or squelch is ON.
8	T/R	Transmit/receive select: "H" in RX mode, "L" in TX mode.
9	TXH	TX power select: "H" in HI mode, "L" in LOW mode.
10	—	Open.
11	B2	Usually "H"
12	—	Open.
13	DP	Serial data input.
14	CP	Clock input.
15	EP2	Enable input.
16	5C	

• Display circuit

The display circuit is contained in the LCD assembly. It consists of a LCD driver, its peripheral circuits, and an LCD. The LCD is dynamically operated at a 50% duty cycle. The LCD driver receives LCD data from P33, P141, and P140 of the CPU.

• Dimmer circuit

The lamp circuit generates a constant voltage of about 8.8 V with SB, Q202, and D202. The lamp circuit resistance is change by turning Q208 and Q209 on and off to control the dimmer. If the lamp is shorted, Q203 decreases the Q202 V_{BE} to prevent an overcurrent from following through Q202.

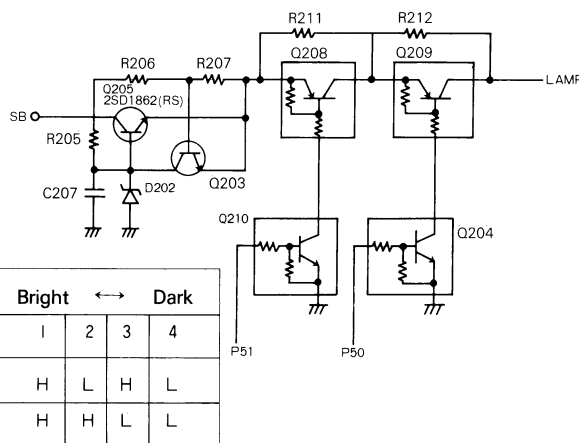


Fig. 12 Dimmer circuit

CIRCUIT DESCRIPTION

• PLL data output

PLL data is available from P21 (CK), P22 (DT), P61 (ACL), and P23 (EN1) of the CPU. Figure 9 is a timing chart for PLL data transfer, and Figure 10 shows the format of PLL data.

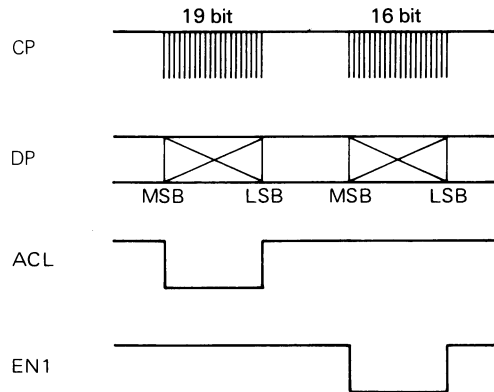


Fig. 13 Timing chart for PLL data transfer

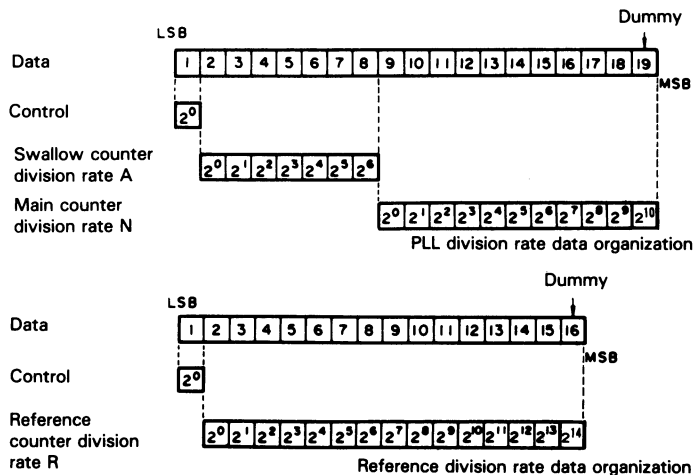


Fig. 14 Data format

• Input and output of CTCSS unit (option)

The optional CTCSS unit receives data from P21, P22, an P73 of the CPU. Figure 14 is a timing chart for CTCSS data transfer, and Figure 15 shows the format of CTCSS data. When a tone from the CTCSS unit is detected, a "H" level signal is sent to P63 of the CPU, opening the squelch.

• Input and output of the remote control unit (option)

When the optional remote control unit is connected, a "H" level signal is applied to INT0 of the CPU, and the following pins have different functions:

- P03 → S1 : Serial data input pin
- P02 → S2 : Serial data output pin
- P01 → SCK : Serial clock I/O pin

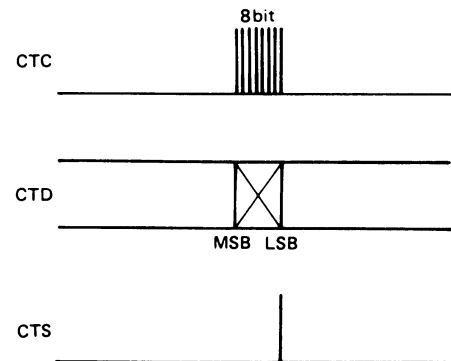


Fig. 15 Timing chart for CTCSS data transfer

Tone frequency select data for CTCSS unit

D1	D2	D3	D4	D5	D6
----	----	----	----	----	----

Example : 88.5Hz L H L H H H

Fig. 16 CTCSS data format

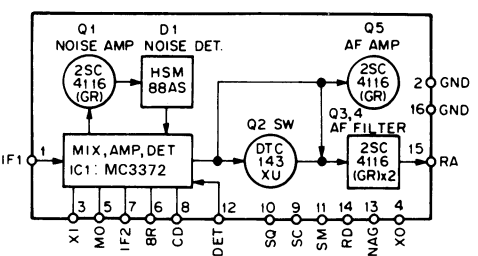
CIRCUIT DESCRIPTION

Pin No.	Pin name	I/O	Logic	Function	Pin No.	Pin name	I/O	Logic	Function
1	P41	O	–	D/A digital output (tone).	33	PTH01	I	–	Mic DOWN/MR/PF input.
2	P40	O	–		34	PTH00	I	–	Mic UP/CALL/VFO input.
3	P53	O	–		35	T10	I	H	CTCSS DET.
4	P52	O	–		36	T11	I	H	Distination set.
5	P51	O	–	Dimmer select.	37	P23	O	L	PLL RST.
6	P50	O	–		38	P22	O	–	PLL IC data output.
7	RESET	I	L	Reset input.	39	P21	O	–	PLL IC clock output.
8	X2	–	–	4.194304MHz crystal oscillator.	40	P20	O	–	Beeper output.
9	X1	–	–		41	P03/SI	I/I	L/–	Mic DOWN/serial data input.
10	P63	O	H		42	P02/SO	I/O	L/–	Mic PTT input/serial data output.
11	P62	O	H	DRS remote.	43	P01/SCK	I/–	L/–	Mic UP input/serial clock I/O.
12	P61	O	L	DRS ACL.	44	INT4	I	H	Back-up detect input.
13	P60	I	H	DTMS signal detect.	45	P123	I	L	CALL, VFO
14	P73	O	H	CTCSS unit ST.	46	P122	I	L	F, MR/M
15	P72	O	H	Shift register ST.	47	P121	I	L	SHIFT, MHz
16	P71	O	H	DRS unit VOB output.	48	P120	I	L	TONE
17	P70	O	H	DRS unit VOA output. DTMF MIC MUTE.	49	P133	I	L	REV
18	P83	I/O	–	DRS CE. DTMF EN.	50	P132	I	L	LOW, DRS/DTSS
19	P82	O	H	DRS unit STBY output.	51	P131	I	H	Transmit power select.
20	P81	O	L	DRS unit \overline{WR} output. DTMF input select.	52	P130	I	L	Busy input.
21	P80	O	L	DRS unit \overline{RD} output.	53	P143	O	L	Squelch control.
22	P93	I/O	H	DRS/DTSS unit data output.	54	P142	O	H	Dimmer control.
23	P92	I/O	H		55	P141	O	–	LCD driver clock output.
24	P91	I/O	H		56	P140	O	–	LCD driver data output.
25	P90	I/O	H		57	NC	–	–	Not used. (VDD)
26	Vss	–	–	GND.	58	VDD	–	–	Power supply pin.
27	P13	I	H	DRS or DTSS unit connect check.	59	P33	O	–	LCD driver enable output.
28	INT2	I	–	Encoder input.	60	P32	O	L	Distination output.
29	INT1	I	–		61	P31	O	L	Key output.
30	P10	I	H	Remote connect detect input.	62	P30	O	L	
31	PTH03	I	–	S-meter analog input.	63	P43	O	–	Tone freq. set output.
32	PTH02	O	–	ALT.	64	P42	O	–	

Table 7 75116GF-728-3BE terminal functions (TX-RX unit IC202)

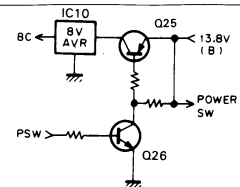
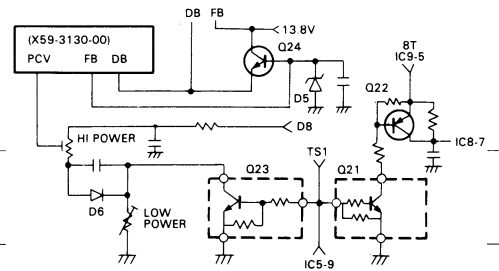
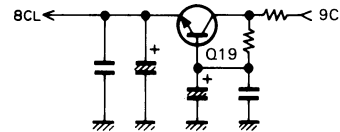
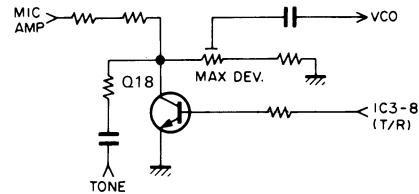
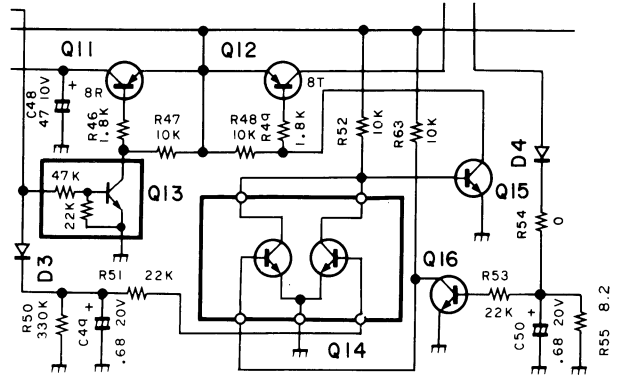
DESCRIPTION OF COMPONENTS

TX-RX UNIT (X57-371X-XX) 0—11: TM-541A (K, P) 2—71: TM-541E (E)

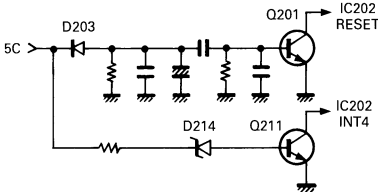
Component	Use/Function	Operation/Condition/Compatibility
IC2	2nd local oscillator, Mixer IF amp, detection low-frequency amplification noise amplification noise detection Squelch switching	① 1st IF signal input (59.7 MHz) ③ 2nd local oscillator (59.245 MHz) ⑨ Busy output ⑩ Squelch control ⑪ S-meter output ⑭ RD output ⑮ Low-frequency output 
IC3	AF amplification	⑧ AF IN ① AF OUT
IC4	Electronic volume control AF switch	② AF output ③ "L" during step-up ④ "L" during step-down ⑤ "H" when electronic volume selected ⑦ Panel volume input ⑧ Panel volume output ⑩ AF input
IC5	Shift register	See circuit description
IC6	5V AVR	
IC7	9V AVR	
IC8	Transmit pre-drive	
IC9	Transmit drive	
IC10	8V AVR	
IC201	6V AVR	
IC202	Microprocessor	See circuit description
IC301	Tone encoder	
Q1	RF amplification	
Q2	RF amplification	
Q4	1st mixer	Converts received 1200 MHz-range signals to 1st IF 59.7 MHz
Q6	IF amplification	Amplifies 1st IF signal
Q7 (1/2)	RD line mute	ON when DRS unit replays
Q7 (1/2)	AF line mute	
Q8 (1/2)	AF amplification	DRS unit
Q8 (1/2)	Reverse current prevention	Used a diode from transistor (base-emitter)
Q9	AF line mute	Operates when transmit mode, AL 1 ch receive mode, CTCSS, BELL is ON
Q10	RF amplification	Amplifies VCO output

DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q11	8R switching	ON in receive mode
Q12	8T switching	ON in Transmit mode
Q13	8R switching control	ON in receive mode
Q14 (1/2)	8T switching control	OFF in transmit mode
Q14 (1/2)	8T switching control	OFF when PLL locked
Q15	8T switching control	ON when transmit
Q16	8T switching control	ON when PLL locked
Q18	Mic amp mute	On in receive mode
Q19	PLL 8V ripple filter	
Q20	RF amplification	VCO output amplification
Q21	Q22 switching control	"OFF" when Low power output "ON" when High power output
Q22	Switching	
Q23	Switching	"OFF" when Low power output "ON" when High power output
Q24	TX drive stage +B control	
Q25	Power switch	
Q26	Q25 control	ON when the power switch is turned on.
Q27	Squelch hysteresis	"ON" when squelch is ON.



DESCRIPTION OF COMPONENTS

Component	Use/Function	Operation/Condition/Compatibility
Q201	Reset switch	ON for approx. 3 ms. when system power turned on. Usually OFF 
Q204, 210	Dimmer switch	ON/OFF for Q206~209
Q205	Function switch	"ON" in Function
Q206, 207	Function dimmer switch	See circuit description
Q208, 209	Lamp dimmer switch	
Q211	Back-up switch	OFF when 5 V line becomes 4 V or less. Usually ON
Q212	Mic mute	
D1	Ref. voltage	Zenar diode for Q1
D3, D4	Reverse current prevention	
D5	Voltage setting	Decrease Tx drive +B voltage below 12 V
D6	Temperature compensation	APC circuit
D7	Temperature compensation	IC9 idling
D8	RF output voltage detection	Detect RF output then control APC circuit
D9~D11	TX/RX switch	ON in transmit mode
D12	Reverse power protection	
D13	Limiter	Protect the FM IF IC multifunction when receiving (heavy reception)
D14	TX/RX switch	ON in transmit mode
D201	Reverse current protection	
D202	Lamp reference voltage	
D203	Reset detect voltage	
D204, D205	Reverse current protection	
D206	Dimmer switch	
D208~210, 212, 213	Destination diode	
D214	Back-up voltage setting	
D217	Reverse current protection	

PLL (X58-3490-11)

Component	Use/Function	Operation/Condition/Compatibility
IC51	PLL	
Q1	VCO	590.15~620.145 MHz
Q2	RF amplification	Amplifies VCO output to ref. level
Q3	TX/RX switch	ON when receiving
Q51~Q53	Loop filter	
Q54	RF amplification	Amplifies VCO output to PLL IC input level
Q101	VCO	Oscillates 454.85~504.845 MHz
Q102	RF amplification	Amplifies VCO output to ref. level
D1, D2	Frequency control	
D3	Modulation	Make a modulation to VCO when transmit
D4	TX/RX switch	
D5	VCO output switch	
D51	UNLOCK detection	
D52	Voltage drop	PLL IC voltage supply 5.0 V→4.5 V
D101	Frequency control	

TM-541A/E

DESCRIPTION OF COMPONENTS

ALT (X59-3510-00)

Component	Use/Function	Operation/Condition/Compatibility
IC1 (1/2)	DC amplification	Amplifies DC voltage of FM · IF IC detection output
IC1 (1/2)	Voltage controller	Protect against load variation of ref. voltage
IC2	Double side switch four switch circuit	①—② ON when ALT ON ③—④ ON when ALT OFF ⑩—⑪ ON when ALT ON
D1, D2	Variable 2nd OSC freq.	Variable 2nd OSC freq. from control voltage of ALT circuit.

PARTS LIST

CAPACITORS

CC 45 TH 1H 220 J
1 2 3 4 5 6

- 1 = Type ceramic, electrolytic, etc.
2 = Shape round, square, etc.
3 = Temp. coefficient
4 = Voltage rating
5 = Value
6 = Tolerance

• Temperature Coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

• Tolerance

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	± 0.25	± 0.5	± 2	± 5	± 10	± 20	+ 40 - 20	+ 80 - 20	+ 100 - 0	10μF-10~+50 4.7μF-10~+75

Less than 10 pF

• Rating voltage

2nd word 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	-
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	-
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	-

• Chip capacitors

(EX) CC 7 3 F SL 1 H 0 0 0 J
1 2 3 4 5 6 7
(Chip) (CH,RH,UJ,SL)
(EX) CK 7 3 F F 1 H 0 0 0 Z
1 2 3 4 5 6 7
(Chip) (B,F)

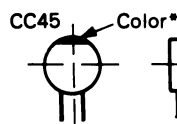
RESISTORS

• Chip resistor (Carbon)

(EX) RD 7 3 E B 2 B 0 0 0 J
1 2 3 4 5 6 7
(Chip) (B,F)

• Carbon resistor (Normal type)

RD 1 4 B B 2 C 0 0 0 J
1 2 3 4 5 6 7



• Capacitor value

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001μF

1 0 3 = 0.01μF

2 2 0 = 22pF
1st number | Multiplier
2nd number

Example CC45TH = -470±60 ppm/°C

Code	B	C	D	F	G
(pF)	± 0.1	± 0.25	± 0.5	± 1	± 2

Dimension

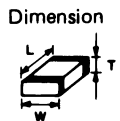
Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25

Dimension

Dimension code	L	W	T	Wattage
E	3.2 ± 0.2	1.6 ± 0.2	0.57	2B
F	2.0 ± 0.3	1.25 ± 0.2	0.45	2A

Rating wattage

Cord	Wattage	Cord	Wattage	Cord	Wattage
2A	1/ 10W	2E	1/ 4W	3A	1W
2B	1/ 8W	2H	1/ 2W	3D	2W
2C	1/ 6W				



PARTS LIST

※ New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
TM-541A/E						
1	1B		A01-1065-03	METALLIC CABINET(UPPER)		
2	2B		A01-1066-03	METALLIC CABINET(BOTTOM)		
3	1C		A10-1292-01	CHASSIS CALKED ASSY		
4	2B		A22-0770-03	SUB PANEL		
5	2A	*	A62-0005-13	PANAL ASSY	KP	
5	2A	*	A62-0010-13	PANAL ASSY	E	
7	2B		B11-0484-08	FILTER(LCD ASSY)		
8	2B		B30-0869-05	LAMP		
9	2B	*	B38-0330-05	LCD ASSY		
10	1B, 1C		B42-2455-04	LABEL(M4x8MAX)		
11	1C		B42-3343-04	LABEL(SERIAL NO)		
12	1B		B42-3356-04	LABEL(EXT SP)		
13A	-		B46-0410-20	WARRANTY CARD	K	
13B	-		B46-0419-00	WARRANTY CARD	E	
13B	-		B46-0422-00	WARRANTY CARD	P	
14A	-	*	B62-0031-00	INSTRUCTION MANUAL	K	
14B	-	*	B62-0032-00	INSTRUCTION MANUAL	PE	
14C	-	*	B62-0033-00	INSTRUCTION MANUAL	E	
15	1C	*	B72-0103-04	MODEL NAME PLATE	KP	
15	1C	*	B72-0104-04	MODEL NAME PLATE	E	
-			E31-3197-15	CONNECTING WIRE(SP)		
-			E31-6014-15	CONNECTING WIRE		
16	1C		E30-2108-05	ANT CABLE(N TYPE)		
17	-		E30-2111-05	DC POWER CORD		
18	1C		E30-2154-05	DC POWER CORD		
-			F05-2036-05	FUSE (20A)		
-		*	F15-0670-04	SHADE		
20	1C		F05-8021-05	FUSE (8A)		
21	1A		F10-1400-04	SHIELDING PLATE		
22	1A	*	F10-1406-04	SHIELDING PLATE		
23	2C	*	F11-1136-14	SHIELDING COVER		
24	2B		F20-0587-04	INSULATING BOARD(LITHIUM BATT)		
25	2B	*	F20-1059-04	INSULATING BOARD(LITHIUM BATT)		
-			G10-0651-04	NON-WOVEN FABRIC		
26	1A		G02-0558-04	FLAT SPRING		
27	1B		G02-0576-14	FLAT SPRING		
28	1C		G02-0579-04	FLAT SPRING		
29	2C		G02-0583-04	FLAT SPRING		
30	2C		G02-0592-04	FLAT SPRING		
31	1A	*	G02-0712-14	FLAT SPRING		
32	2A		G09-0405-05	KNOB FIXD SPRING		
39	1B, 2C		G10-0681-04	NON-WOVEN FABRIC(CHASSIS)		
40	1B, 2B		G10-0686-04	NON-WOVEN FABRIC(CABINET)		
41	2A		G13-0906-04	CUSHION(3 KEY)		
42	2C		G13-0916-04	CUSHION		
43	1A		G13-0926-04	CUSHION		
44	2A		G13-0960-04	CUSHION(6 KEY)		
45	2B		G13-0961-04	CUSHION(LOW)		
46	1B	*	G16-0535-04	SHEET		
-		*	H62-0055-04	QUTER PACKING CASE	KP	
-		*	H62-0056-04	QUTER PACKING CASE	E	

TM-541A: K, P

TM-541E: E

PARTS LIST

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-371X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
47	-		H10-2658-02	POLYSTYRENE FOAMED FIXTURE		
48A	-		H11-0822-04	POLYSTYRENE PLATE	K	
48B	-		H11-0823-04	POLYSTYRENE PLATE	PE	
49	-		H13-0814-04	POLYSTYRENE PLATE		
50	-		H13-0825-04	POLYSTYRENE PLATE	PE	
51	-		H25-0029-04	PROTECTION BAG(MIC HOOK)	KP	
52	-		H25-0117-04	PROTECTION BAG(DC CORD ASSY)		
53	-		H25-0720-04	PROTECTION BAG(TM-541A/E)		
54	-	*	H52-0063-04	ITEM CARTON BOX	KP	
54	-	*	H52-0064-04	ITEM CARTON BOX	E	
55	1C		J19-1434-04	HOLDER(SP)		
56	-		J20-0319-24	MIC HOOK	KP	
57	-		J21-4147-14	MOUNTING HARDWARE		
58	2A		J21-4303-08	MOUNTING HARDWARE(LCD ASSY)		
59	-		J29-0436-03	BRACKET		
60	2B		K27-3035-14	KNOB(VFO, MR, MHz)		
61	2B		K27-3066-04	KNOB(POWER)		
62	2B		K27-3067-04	KNOB(LOW)		
63	2A		K27-3068-04	KNOB(CALL)		
64	2A		K27-3069-04	KNOB(F)		
65	2A		K27-3071-04	KNOB(TONE)		
66	2A		K27-3072-04	KNOB(REW)		
67	2A		K27-3074-04	KNOB(SHIFT)		
68	2A	*	K27-3075-04	KNOB(DR/DT)		
69	2A		K29-3156-04	KNOB ASSY(MAIN)		
70	2A		K29-3157-04	KNOB ASSY(VOL, SQL)		
A	2C		N09-0626-04	SCREW		
B	2B		N09-0650-05	SCREW		
C	1C, 2C		N33-2606-45	OVAL HEAD MACHINE SCREW		
D	1C, 2C		N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
E	2B		N87-2610-46	BRAZIER HEAD TAPTITE SCREW		
F	2B		N88-2606-46	FLAT HEAD TAPTITE SCREW		
G	-		N46-3010-46	PAN HEAD TAPPING SCREW	KP	
71	-		N99-0331-05	SCREW SET		
72	2C		S59-0441-05	SWITCH		
73	-		T91-0380-35	MICROPHONE	KP	
73	-		T91-0382-25	MICROPHONE	E	
SP	1C		T07-0246-05	LOUDSPEAKER(FULLRANGE)		
74	-		W01-0414-04	WRENCH		
75	2B		W09-0326-05	LITHIUM BATTERY		
76	2B, 2C	*	X57-3710-11	TX-RX UNIT(A/3, B/3, C/3)	KP	
76	2B, 2C	*	X57-3712-71	TX-RX UNIT(A/3, B/3, C/3)	E	
-		*	490-0160-05	PROTECTION SHEET		
77	1A		490-0039-05	PROTECTION TAPE		
78	2B		490-0093-05	PROTECTION SHEET(FRONT GLASS)		
TX-RX UNIT (X57-371X-XX) 0-11: TM-541A, 2-71: TM-541E						
C1			CK73FB1H102K	CHIP C 1000PF K		
C2			CC73FCH1H1R5C	CHIP C 1.5PF C		
C4			CC73FSL1H470J	CHIP C 47PF J		
C5			CK73FB1H102K	CHIP C 1000PF K		
C6			CC73FSL1H470J	CHIP C 47PF J		

TM-541A: K, P

TM-541E: E

PARTS LIST

✕ New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Telle ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-371X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C7			CK73FB1H102K	CHIP C 1000PF K		
C8			CC73FCH1H020C	CHIP C 2.0PF C		
C10			CK73FB1H102K	CHIP C 1000PF K		
C11			CC73FSL1H101J	CHIP C 100PF J		
C12			CC73FCH1H020C	CHIP C 2.0PF C		
C13			CC73FSL1H101J	CHIP C 100PF J		
C15			CE04EW1A470M	ELECTRØ 47UF 10WV		
C16			CK73FB1H103K	CHIP C 0.010UF K		
C17			CC73FCH1H1R5C	CHIP C 1.5PF C		
C18			CC73FCH1H010C	CHIP C 1PF C		
C20			CC73FCH1H080D	CHIP C 8PF D		
C21 ,22			CK73FB1H102K	CHIP C 1000PF K		
C23			CC73FCH1H080D	CHIP C 8PF D		
C24 ,25			CK73FB1H102K	CHIP C 1000PF K		
C26			CC73FCH1H150J	CHIP C 15PF J		
C27			CC73FCH1H220J	CHIP C 22PF J		
C28 ,29			CK73FB1H103K	CHIP C 0.010UF K		
C30			CE04EW1A470M	ELECTRØ 47UF 10WV		
C31			CK73EF1C105Z	CHIP C 1.0UF Z		
C32			CK73EB1E104K	CHIP C 0.10UF K		
C33			CK73EF1C105Z	CHIP C 1.0UF Z		
C34			CK73EB1E104K	CHIP C 0.10UF K		
C35			CE04EW1A471M	ELECTRØ 470UF 10WV		
C36			CE04EW1A470M	ELECTRØ 47UF 10WV		
C37			CE04EW1C470M	ELECTRØ 47UF 16WV		
C38			CK73FB1H103K	CHIP C 0.010UF K		
C39 ,40			CE04EW1A470M	ELECTRØ 47UF 10WV		
C41			CK73FB1H273K	CHIP C 0.027UF K		
C42			CC73FSL1H101J	CHIP C 100PF J		
C43			CE04EW1E4R7M	ELECTRØ 4.7UF 25WV		
C44 ,45			CK73EF1C105Z	CHIP C 1.0UF Z		
C46			CC73FSL1H101J	CHIP C 100PF J		
C47			CC73FCH1H030C	CHIP C 3PF C		
C48			CE04EW1A470M	ELECTRØ 47UF 10WV		
C49 ,50			C92-0504-05	CHIP TAN 0.68UF 20WV		
C51 ,52			CK73FB1H102K	CHIP C 1000PF K		
C53			CC73FSL1H101J	CHIP C 100PF J		
C54			CE04EW1C101M	ELECTRØ 100UF 16WV		
C55			CK73EF1C105Z	CHIP C 1.0UF Z		
C56			CC73FSL1H101J	CHIP C 100PF J		
C57			CK73FB1H103K	CHIP C 0.010UF K		
C58 ,59			CC73FSL1H101J	CHIP C 100PF J		
C60			CC73FSL1H470J	CHIP C 47PF J		
C61			CE04EW1A101M	ELECTRØ 100UF 10WV		
C62 ,63			CK73FB1H103K	CHIP C 0.010UF K		
C64 ,65			CE04EW1A101M	ELECTRØ 100UF 10WV		
C66			CK73FB1H103K	CHIP C 0.010UF K		
C67			CE04EW1A101M	ELECTRØ 100UF 10WV		
C68 ,69			CK73FB1H103K	CHIP C 0.010UF K		
C70			CC73FSL1H101J	CHIP C 100PF J		
C71			CK73FB1H102K	CHIP C 1000PF K		
C72			CC73FCH1H120J	CHIP C 12PF J		
C73			CC73FCH1H030C	CHIP C 3PF C		
C74			CK73FB1H103K	CHIP C 0.010UF K		
C75			CC73FSL1H101J	CHIP C 100PF J		

TM-541A: K, P

TM-541E: E

PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-371X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C76			CC73FCH1H050C	CHIP C 5PF C		
C77			CC73FCH1H020C	CHIP C 2.0PF C		
C78			CK73FB1H103K	CHIP C 0.010UF K		
C79			CC73FCH1H040C	CHIP C 4PF C		
C81			CK73FB1H102K	CHIP C 1000PF K		
C82			CE04EW1C100M	ELECTRØ 10UF 16WV		
C83 -85			CK73FB1H102K	CHIP C 1000PF K		
C86			CC73FSL1H101J	CHIP C 100PF J		
C87 ,88			CK73FB1H102K	CHIP C 1000PF K		
C89			CE04EW1C100M	ELECTRØ 10UF 16WV		
C90 ,91			CK73FB1H102K	CHIP C 1000PF K		
C92 ,93			CK73EF1C105Z	CHIP C 1.0UF Z		
C95			CE04EW1C470M	ELECTRØ 47UF 16WV		
C97			CC73FCH1H100D	CHIP C 10PF D		
C98 ,99			CK73FB1H471K	CHIP C 470PF K		
C100			CC73FCH1H020C	CHIP C 2.0PF C		
C101			CM73F2H470J	CHIP C 47PF J		
C102			CM73F2H010C	CHIP C 1.0PF C		
C103			CK73FB1H471K	CHIP C 470PF K		
C104			CE04EW1A470M	ELECTRØ 47UF 10WV		
C105,106			CK73FB1H103K	CHIP C 0.010UF K		
C107			C90-0840-05	ELECTRØ CAPACITOR(AL)		
C108,109			CK73FB1H103K	CHIP C 0.010UF K		
C110			C90-2092-05	ELECTRØ 10UF 16WV		
C111			CK73FB1H102K	CHIP C 1000PF K		
C112			C92-0004-05	CHIP TAN 1.0UF 16WV		
C113			CC73FSL1H101J	CHIP C 100PF J		
C114			CK73FB1H102K	CHIP C 1000PF K		
C116			CK73EB1E104K	CHIP C 0.10UF K		
C117			CK73FB1H472K	CHIP C 4700PF K		
C118			CK73EF1C105Z	CHIP C 1.0UF Z		
C119			CK73EB1E683K	CHIP C 0.068UF K		
C120			CK73EF1C105Z	CHIP C 1.0UF Z		
C121			C90-2092-05	ELECTRØ 10UF 16WV		
C122		*	CM73F2H0R5C	CHIP C 0.5PF C		
C124,125			CC73FCH1H020C	CHIP C 2.0PF C		
C126-128			CC73FSL1H101J	CHIP C 100PF J		
C130,131			CC73FSL1H101J	CHIP C 100PF J		
C132			CK73FB1H332K	CHIP C 3300PF K		
C201			CK73FB1H103K	CHIP C 0.010UF K		
C202			CE04NW0J221M	ELECTRØ 220UF 6.3WV		
C203			CK73FB1E223K	CHIP C 0.022UF K		
C204			CK73FB1H102K	CHIP C 1000PF K		
C205,206			CC73FCH1H330J	CHIP C 33PF J		
C207			CK73FB1H102K	CHIP C 1000PF K		
C208			CK73FB1H103K	CHIP C 0.010UF K		
C209			CK73FB1H102K	CHIP C 1000PF K		
C211			CK73FB1H103K	CHIP C 0.010UF K		
C212			CK73FB1H102K	CHIP C 1000PF K		
C213-216			CK73FB1H471K	CHIP C 470PF K		
C217			CK73FB1H102K	CHIP C 1000PF K		
C220			CK73FB1H103K	CHIP C 0.010UF K		
C301			C92-0005-05	CHIP TAN 2.2UF 6.3WV		
C302			CK73FB1H102K	CHIP C 1000PF K		
C303			CK73FB1E393K	CHIP C 0.039UF K		

TM-541A: K, P

TM-541E: E

PARTS LIST

✕ New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Telle ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-371X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C304			CC73FCH1H270J	CHIP C 27PF J		
CN1			E40-3237-05	PIN CONNECTOR(2PIN SP)		
CN2			E40-5182-05	PIN CONNECTOR(5PIN DRU)		
CN3 , 4			E40-5202-05	PIN CONNECTOR(13PIN CONT)		
CN5			E40-3237-05	PIN CONNECTOR(2PIN TSI)		
CN6			E40-5183-05	PIN CONNECTOR(6PIN DTU)		
CN201, 202			E40-5203-05	PIN CONNECTOR(13PIN)		
CN205			E40-5341-05	PIN CONNECTOR(9PIN LCD)		
CN206			E40-5187-05	PIN CONNECTOR(10PIN DRU/DTU)		
CN207			E40-5185-05	PIN CONNECTOR(8PIN DRU/DTU)		
J1			E11-0425-05	PHONE JACK		
J3			E04-0154-05	RF COAXIAL CABLE RECEPTACLE		
J201			E06-0860-05	CYLINDRICAL RECEPTACLE(MIC)		
TP1		*	E23-0649-05	TERMINAL		
TP3 , 4		*	E23-0649-05	TERMINAL		
W1		*	E33-1878-25	FINISHED WIRE SET		
W201			E33-1871-15	FINISHED WIRE SET	KP	
W202			E31-6003-15	CONNECTING WIRE		
W301		*	E37-0055-05	CONNECTING WIRE		
			J30-0545-05	SPACER		
			J31-0534-05	COLLAR(LCD)		
CD1			L79-1013-05	FILTER		
CF1			L72-0366-05	CERAMIC FILTER		
L1 , 2			L79-0827-05	FILTER		
L4		*	L34-4259-05	COIL		
L6			L34-2034-05	COIL		
L7			L40-5682-19	SMALL FIXED INDUCTOR		
L8		*	L40-3982-19	SMALL FIXED INDUCTOR		
L9			L40-1001-19	SMALL FIXED INDUCTOR		
L301			L78-0018-05	RESONATOR(3.58MHz)		
X1			L77-1375-05	CRYSTAL RESONATOR(59.245MHz)		
X2			L77-1376-25	CRYSTAL RESONATOR(12.8MHz)		
X201			L77-1397-05	CRYSTAL RESONATOR		
XF1			L71-0280-05	CRYSTAL FILTER		
R1			RK73FB2A470J	CHIP R 47 J 1/10W		
R2			RK73FB2A221J	CHIP R 220 J 1/10W		
R3			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R4			RK73FB2A153J	CHIP R 15K J 1/10W		
R5			RK73FB2A4R7J	CHIP R 4.7 J 1/10W		
R6			RK73FB2A471J	CHIP R 470 J 1/10W		
R11			RK73FB2A471J	CHIP R 470 J 1/10W		
R12			RK73FB2A560J	CHIP R 56 J 1/10W		
R15			R92-0670-05	CHIP R 0 OHM		
R17			RK73FB2A151J	CHIP R 150 J 1/10W		
R18			R92-0670-05	CHIP R 0 OHM		
R19			RK73FB2A101J	CHIP R 100 J 1/10W		
R20			R92-0670-05	CHIP R 0 OHM		
R21			RK73FB2A331J	CHIP R 330 J 1/10W		
R22			RK73FB2A224J	CHIP R 220K J 1/10W		
R24			RK73FB2A561J	CHIP R 560 J 1/10W		
R25			RK73FB2A223J	CHIP R 22K J 1/10W		
R26			RK73FB2A101J	CHIP R 100 J 1/10W		
R27 , 28			RK73FB2A102J	CHIP R 1.0K J 1/10W		

TM-541A: K, P

TM-541E: E

PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-371X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕 向	Re- marks 備考
R29			RK73FB2A334J	CHIP R 330K J 1/10W		
R30			R92-0670-05	CHIP R 0 0HM		
R31			RK73FB2A331J	CHIP R 330 J 1/10W		
R32			R92-0670-05	CHIP R 0 0HM		
R33			RK73FB2A101J	CHIP R 100 J 1/10W		
R34			R92-0670-05	CHIP R 0 0HM		
R35			RK73FB2A473J	CHIP R 47K J 1/10W		
R36			RK73FB2A333J	CHIP R 33K J 1/10W		
R37			RK73FB2A473J	CHIP R 47K J 1/10W		
R38			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R39			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R40			RK73FB2A223J	CHIP R 22K J 1/10W		
R41			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R42			RK73FB2A101J	CHIP R 100 J 1/10W		
R44			RK73FB2A473J	CHIP R 47K J 1/10W		
R45			RK73FB2A223J	CHIP R 22K J 1/10W		
R46			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R47 , 48			RK73FB2A103J	CHIP R 10K J 1/10W		
R49			RK73FB2A182J	CHIP R 1.8K J 1/10W		
R50			RK73FB2A334J	CHIP R 330K J 1/10W		
R51			RK73FB2A223J	CHIP R 22K J 1/10W		
R52			RK73FB2A103J	CHIP R 10K J 1/10W		
R53			RK73FB2A223J	CHIP R 22K J 1/10W		
R54			R92-0670-05	CHIP R 0 0HM		
R55			RK73FB2A822J	CHIP R 8.2K J 1/10W		
R56 -58			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R59			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R60			RK73FB2A392J	CHIP R 3.9K J 1/10W	KP	
R60			RK73FB2A563J	CHIP R 56K J 1/10W	E	
R61			RK73FB2A222J	CHIP R 2.2K J 1/10W	KP	
R61			R92-0670-05	CHIP R 0 0HM		
R62			R92-0670-05	CHIP R 0 0HM	E	
R63			RK73FB2A103J	CHIP R 10K J 1/10W		
R64			RK73FB2A473J	CHIP R 47K J 1/10W		
R65			RK73FB2A223J	CHIP R 22K J 1/10W		
R66			RK73FB2A103J	CHIP R 10K J 1/10W		
R67			RK73FB2A331J	CHIP R 330 J 1/10W		
R68 -70			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R71			RK73FB2A220J	CHIP R 22 J 1/10W		
R72			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R73			RK73FB2A100J	CHIP R 10 J 1/10W		
R74			RK73FB2A220J	CHIP R 22 J 1/10W		
R75			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R76			RK73FB2A180J	CHIP R 18 J 1/10W		
R77			RK73FB2A331J	CHIP R 330 J 1/10W		
R78			RK73FB2A180J	CHIP R 18 J 1/10W		
R79			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R80			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R81			RK73FB2A151J	CHIP R 150 J 1/10W		
R82 , 83			RK73FB2A101J	CHIP R 100 J 1/10W		
R84			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R85			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R86			RK73FB2A100J	CHIP R 10 J 1/10W		
R87			RK73FB2A104J	CHIP R 100K J 1/10W		
R88			R92-1201-05	SILID 220 1/2W		

TM-541A: K, P

TM-541E: E

PARTS LIST

※ New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-371X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R89			R92-0670-05	CHIP R 0 ΩHM		
R90			R92-1211-05	SOLID R 5.6K J 1/2W		
R91			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R92			RK73FB2A470J	CHIP R 47 J 1/10W		
R93			R92-0700-05	CHIP R 180 1/2W		
R94			R92-1215-05	CHIP R 470 J 1/2W		
R95 ,96			RK73FB2A103J	CHIP R 10K J 1/10W		
R97			RK73FB2A331J	CHIP R 330 J 1/10W		
R98			R92-1220-05	FIXED R		
R99			RK73FB2A561J	CHIP R 560 J 1/10W		
R100,101			R92-0670-05	CHIP R 0 ΩHM		
R102			R92-0670-05	CHIP R 0 ΩHM		
R103			RK73FB2A273J	CHIP R 27K J 1/10W		
R105			RK73FB2A104J	CHIP R 100K J 1/10W		
R106			RK73FB2A394J	CHIP R 390K J 1/10W		
R107			RK73FB2A103J	CHIP R 10K J 1/10W		
R108			RK73FB2A473J	CHIP R 47K J 1/10W		
R109			RK73FB2A104J	CHIP R 100K J 1/10W		
R201			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R202			RK73FB2A563J	CHIP R 56K J 1/10W		
R203			RK73FB2A474J	CHIP R 470K J 1/10W		
R204			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R205			RK73FB2A561J	CHIP R 560 J 1/10W		
R206			RK73FB2A103J	CHIP R 10K J 1/10W		
R207			RK73FB2A471J	CHIP R 470 J 1/10W		
R208			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R209			RK73EB2B220J	CHIP R 22 J 1/8W		
R210,211			R92-0685-05	CHIP R 22 J 1/2W		
R212			R92-1262-05	FIXED R		
R213			R92-0670-05	CHIP R 0 ΩHM		
R214			RK73FB2A152J	CHIP R 1.5K J 1/10W		
R215			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R216-218			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R219			RK73FB2A473J	CHIP R 47K J 1/10W		
R220			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R222			RK73FB2A151J	CHIP R 150 J 1/10W		
R223			RK73FB2A473J	CHIP R 47K J 1/10W		
R225			RK73FB2A104J	CHIP R 100K J 1/10W		
R226-228			RK73FB2A473J	CHIP R 47K J 1/10W		
R229-232			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R233			RK73FB2A473J	CHIP R 47K J 1/10W		
R234,235			RK73FB2A104J	CHIP R 100K J 1/10W		
R236,237			RK73FB2A474J	CHIP R 470K J 1/10W		
R238			RK73FB2A473J	CHIP R 47K J 1/10W		
R239			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R240,241			R92-0670-05	CHIP R 0 ΩHM		
R242			RK73EB2B180J	CHIP R 18 J 1/8W		
VR1			R12-6429-05	TRIMMING POT. 100K		
VR2			R12-6421-05	TRIM POT. 4.7K		
VR3			R12-3132-05	TRIM POT. 47K		
VR4			R12-6423-05	TRIM POT. 10K		
VR5			R12-6427-05	TRIM POT. 47K		
VR201			R05-3441-05	POTENTIOMETER 10K(A)		
VR202			R05-4420-05	POTENTIOMETER 50K(B)		
VR301			R12-6427-05	TRIM POT. 47K		

TM-541A: K, P

TM-541E: E

PARTS LIST

* New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-371X-XX)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
S201 S202-211			S40-2458-05 S40-1086-05	PUSH SWITCH PUSH SWITCH		
D1 D3 ,4 D5 D6 ,7 D8			02CZ3.6(Y,Z) 1SS184 02CZ12(X,Y) 1SS187 HSK151	DIODE DIODE DIODE DIODE DIODE		
D9 -11 D12 D13 D14 D15			M1808 0SA3A1 MA716 M1808 * 02CZ6.2(Z)	DIODE DIODE DIODE DIODE DIODE		
D201 D202 D203 D204 D205,206		*	LFB01 02CZ9.1(Y) 02CZ3.0(Z) 1SS181 1SS184	DIODE DIODE DIODE DIODE DIODE		
D207 D208 D209 D210 D212,213			B30-0852-05 1SS184 1SS184 1SS184 MA141A	LED DIODE DIODE DIODE DIODE	KP KP	
D214 D215 D216 IC1 IC2		*	02CZ3.9(Z) 1SS226 1SS184 LC7582 KCD04	DIODE DIODE DIODE IC(LCD DRIVER) IC		
IC3 IC4 IC5 IC6 IC7			UPC1241H KCC02 TC9174F NJM78L05UA LA5009M	IC IC IC(CMOS I/O) IC(5V AVR) IC(9V AVR)		
IC8 IC9 IC10 IC201 IC202			KCB01 KCB07 MC7808CT NJM78L06UA * 75116GF-728-3BE	IC(DRIVE AMP) IC IC(VOLTAGE REGULATORS/ +8V) IC(VOLTAGE REGULATOR/ +6V) IC(CPU)		
IC301 IC401 Q1 Q2 Q4			S7116A M67711 MGF1502 2SC4095(R47.6) 3SK184(R)	IC(TONE ENCODER) IC(POWER MODULE/ 1.24-1.3BHZ) IC TRANSISTOR FET		
Q6 Q7 Q8 Q9 Q10			2SC3120 FMG2 IMX1 2SD1757(K) 2SC3356	TRANSISTOR TRANSISTOR TRANSISTOR TRANSISTOR TRANSISTOR		
Q11 Q12 Q13 Q14 Q15 ,16			2SB1119S 2SB1302S DTC144WK FMW1 2SC2712(Y)	TRANSISTOR TRANSISTOR DIGITAL TRANSISTOR TRANSISTOR TRANSISTOR		
Q18 Q19			2SD1757K 2SC2712(Y)	TRANSISTOR TRANSISTOR		

TM-541A: K, P

TM-541E: E

PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

TX-RX UNIT (X57-371X-XX)

PLL UNIT (X58-3490-11)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
Q20 Q21 Q22 Q23 Q24			2SC3356 DTC124EK 2SA1162(Y) DTC114EK 2SD1406(Y)	TRANSISTOR DIGITAL TRANSISTOR TRANSISTOR DIGITAL TRANSISTOR TRANSISTOR		
Q25 Q26 Q27 Q201 Q202			2SB1302S 2SC2712(Y) 2SJ144(GR) 2SC2712(Y) 2SD1682(R,S)	TRANSISTOR TRANSISTOR FET TRANSISTOR TRANSISTOR		
Q203 Q204 Q205 Q206-209 Q210			2SC2712(Y) DTC114EK DTC1143EK 2SA1519 DTC114EK	TRANSISTOR DIGITAL TRANSISTOR DIGITAL TRANSISTOR TRANSISTOR DIGITAL TRANSISTOR		
Q211 Q212			2SC2712(Y) FMG2	TRANSISTOR TRANSISTOR		
S212			W02-0388-05 X58-3490-11 X59-3130-00 X59-3510-00 X59-3610-00 212-2503-05	ENCODER SUB UNIT(PLL) MODULE UNIT(APC) MODULE UNIT(ALT) MODULE UNIT(MIC) PLASTIC TUBE		
PLL UNIT (X58-3490-11)						
C1 C2 ,3 C5 C6 C7			CK73GB1H102K CC73GSL1H101J CK73GB1H102K CC73GCH1H010C CC73GCH1H0R5C	CHIP C 1000PF K CHIP C 100PF J CHIP C 1000PF K CHIP C 1PF C CHIP C 0.5PF C		
C8 C9 C10 C11 C12			CC73GCH1H040C CK73GB1H102K CC73GSL1H101J C92-0001-05 CC73GCH1H070D	CHIP C 4PF C CHIP C 1000PF K CHIP C 100PF J CHIP-TAN 0.1UF 35WV CHIP C 7PF D		
C13 C14 C15 C16 C17			CC73FCH1H020C CC73GCH1H040C CC73FCH1H1R5C CC73GCH1H070C CC73GCH1H010C	CHIP C 2.0PF C CHIP C 4PF C CHIP C 1.5PF C CHIP C 7.0PF C CHIP C 1PF C		
C18 C19 C51 C52 C53 ,54			CC73GCH1H030C CC73GCH1H010C CK73GB1H102K CC73GSL1H101J CK73GB1H102K	CHIP C 3PF C CHIP C 1PF C CHIP C 1000PF K CHIP C 100PF J CHIP C 1000PF K		
C55 C56 ,57 C59 C60 C61			CK73GB1E103K C92-0501-05 CC73GCH1H060D CC73GSL1H101J CC73GCH1H020C	CHIP C 0.010UF K CHIP-TAN 1.5UF 6.3WV CHIP C 6PF D CHIP C 100PF J CHIP C 2.0PF C		
C62 C63 -65 TC1			CC73GCH1H120J CC73GSL1H101J C05-0369-05	CHIP C 12PF J CHIP C 100PF J TRIM CAP 6PF		

TM-541A: K, P

TM-541E: E

PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

PLL UNIT (X58-3490-11)

APC UNIT (X59-3130-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
CN1 CN2 CN3			E40-0311-05 E40-0411-05 E40-5211-05	PIN CONNECTOR PIN CONNECTOR PIN CONNECTOR		
			F11-1122-14	SHIELDING COVER		
L1 ,2 L3 L4			L40-3382-19 L40-8272-80 L40-1582-19	SMALL FIXED INDUCTOR(0.33MH) SMALL FIXED INDUCTOR(82NH) SMALL FIXED INDUCTOR(150NH)		
R1 ,2 R3 R4 R5 R6			R92-1252-05 RK73GB1J104J RK73GB1J472J RK73GB1J682J RK73GB1J220J	CHIP R 0 OHM CHIP R 100K J 1/16W CHIP R 4.7K J 1/16W CHIP R 6.8K J 1/16W CHIP R 22 J 1/16W		
R7 R9 R10 R11 R12			RK73GB1J470J RK73GB1J123J RK73GB1J680J RK73GB1J223J RK73GB1J103J	CHIP R 47 J 1/16W CHIP R 12K J 1/16W CHIP R 68 J 1/16W CHIP R 22K J 1/16W CHIP R 10K J 1/16W		
R13 R14 R51 R52 R53			RK73GB1J101J R92-1252-05 RK73GB1J223J RK73GB1J562J RK73GB1J103J	CHIP R 100 J 1/16W CHIP R 0 OHM CHIP R 22K J 1/16W CHIP R 5.6K J 1/16W CHIP R 10K J 1/16W		
R54 R55 R56 R57 R58 ,59			RK73GB1J221J RK73GB1J222J RK73GB1J682J R92-1252-05 RK73GB1J101J	CHIP R 220 J 1/16W CHIP R 2.2K J 1/16W CHIP R 6.8K J 1/16W CHIP R 0 OHM CHIP R 100 J 1/16W		
R60 R61 R62 R63 R64			RK73GB1J152J RK73GB1J102J RK73GB1J180J RK73GB1J331J RK73GB1J180J	CHIP R 1.5K J 1/16W CHIP R 1.0K J 1/16W CHIP R 18 J 1/16W CHIP R 330 J 1/16W CHIP R 18 J 1/16W		
R65 R66 R67 R68 R69			RK73GB1J474J R92-1252-05 RK73GB1J101J R92-1252-05 RK73FB2A225J	CHIP R 470K J 1/16W CHIP R 0 OHM CHIP R 100 J 1/16W CHIP R 0 OHM CHIP R 2.2M J 1/10W		
D1 ,2 D3 D4 D51 D52		*	1T33C MA360 MA77 LFB01 1SS184	DIODE DIODE DIODE DIODE DIODE		
IC51 Q1 Q2 Q3 Q51 -53 Q54			MB1501PF 2SK582 2SC4093 DTC114YU 2SC3324(B) 2SC3356	IC FET TRANSISTOR DIGITAL TRANSISTOR TRANSISTOR TRANSISTOR		
APC UNIT (X59-3130-00)						
C1 C2 C3 C4			CK73FB1H102K C92-0501-05 CK73FB1H472K CK73FB1H102K	CHIP C 1000PF K CHIP-TAN 1.5UF 6.3WV CHIP C 4700PF K CHIP C 1000PF K		

TM-541A: K, P

TM-541E: E

PARTS LIST

※ New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

APC UNIT (X59-3130-00)

ALT UNIT (X59-3510-00)

MIC UNIT (X59-3610-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
C5 C6			CK73FB1H472K CK73FB1H102K E23-0471-05	CHIP C 4700PF K CHIP C 1000PF K TERMINAL		
R1 R2 R3 R4 ,5 R6			RD41FB2B222J RD41FB2B102J RD41FB2B152J RD41FB2B103J RD41FB2B122J	CARBON 2.2K J 1/8W CARBON 1K J 1/8W CARBON 1.5K J 1/8W CARBON 10K J 1/8W CARBON 1.2K J 1/8W		
Q1 ,2 Q3			FMW1 2SA1162(Y)	TRANSISTOR TRANSISTOR		
ALT UNIT (X59-3510-00)						
C1 C2 C3 C4 C5			CK73FB1H223K CK73FB1H103K CK73FB1E393K CC73FUJ1H221J CK73FB1H102K	CHIP C 0.022UF K CHIP C 0.010UF K CHIP C 0.039UF K CHIP C 220PF J CHIP C 1000PF K		
C6			CK73FF1E104Z	CHIP C 0.1UF Z		
TP1			E23-0471-05 E23-0619-05	TERMINAL TERMINAL		
R1 R2 R3 R4 R5			RK73FB2A472J RK73FB2A154J RK73FB2A273J RK73FB2A333J RK73FB2A103J	CHIP R 4.7K J 1/10W CHIP R 150K J 1/10W CHIP R 27K J 1/10W CHIP R 33K J 1/10W CHIP R 10K J 1/10W		
R6 R7 R8 R9 R10 ,11			RK73FB2A473J RK73FB2A104J RK73FB2A273J RK73FB2A393J RK73FB2A472J	CHIP R 47K J 1/10W CHIP R 100K J 1/10W CHIP R 27K J 1/10W CHIP R 39K J 1/10W CHIP R 4.7K J 1/10W		
R12			R92-0670-05	CHIP R 0 OHM		
D1 ,2 IC1 IC2			1SV166 NJM4558M MN4066BS	DIODE IC(OP AMP X2) IC(QUAD ANALOG SWITCH)		
MIC UNIT (X59-3610-00)						
C1 C2 C3 C4 C5			CK73FF1E104Z CK73GB1H102K CK73FB1E333K CC73GCH1H270J C92-0004-05	CHIP C 0.1UF Z CHIP C 1000PF K CHIP C 0.033UF K CHIP C 27PF J CHIP TAN 1.0UF 16WV		
C6 C7 C8 C9 C10			CK73FB1E333K CK73GB1H681K CK73GB1H332K CC73GCH1H820J CC73GCH1H101J	CHIP C 0.033UF K CHIP C 680PF K CHIP C 3300PF K CHIP C 82PF J CHIP C 100PF J		
C11			CK73GB1H102K E23-0471-05	CHIP C 1000PF K TERMINAL		
R1 R2 R3 R4			RK73GB1J223J RK73GB1J104J RK73GB1J561J RK73GB1J470J	CHIP R 22K J 1/16W CHIP R 100K J 1/16W CHIP R 560 J 1/16W CHIP R 47 J 1/16W		

TM-541A: K, P

TM-541E: E

PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

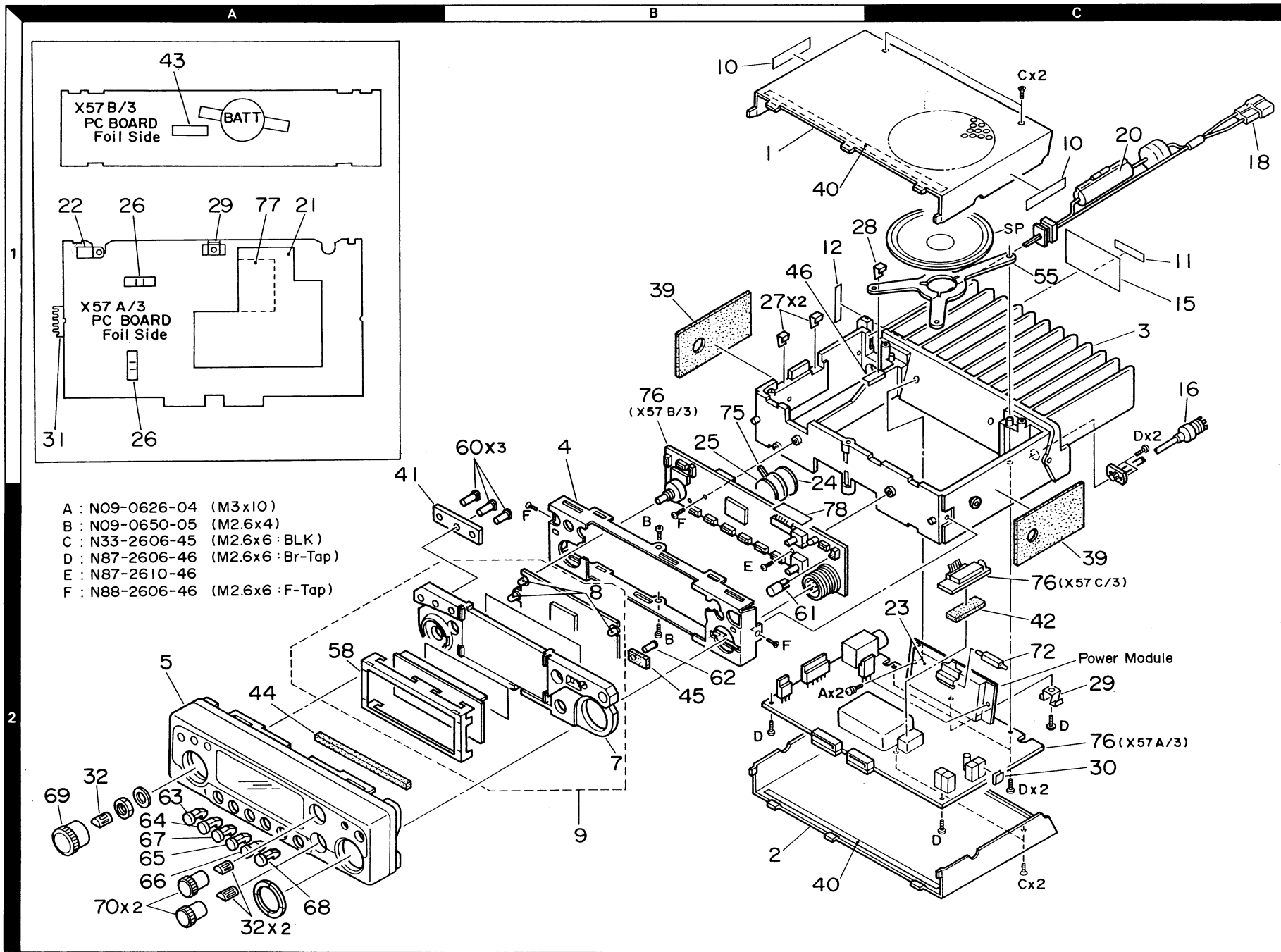
MIC UNIT (X59-3610-00)

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R5			RK73GB1J561J	CHIP R 560 J 1/16W		
R6			R92-1252-05	CHIP R 0 OHM		
R7			RK73GB1J394J	CHIP R 390K J 1/16W		
R8			RK73GB1J224J	CHIP R 220K J 1/16W		
R9			RK73GB1J184J	CHIP R 180K J 1/16W		
R10			RK73GB1J333J	CHIP R 33K J 1/16W		
R11			RK73FB2A473J	CHIP R 47K J 1/10W		
R12			RK73GB1J224J	CHIP R 220K J 1/16W		
R13 -15			RK73GB1J823J	CHIP R 82K J 1/16W		
R16			R92-1252-05	CHIP R 0 OHM		
IC1			NJM4558M	IC(OP AMP X2)		
Q1			2SC4116(GR)	TRANSISTOR		

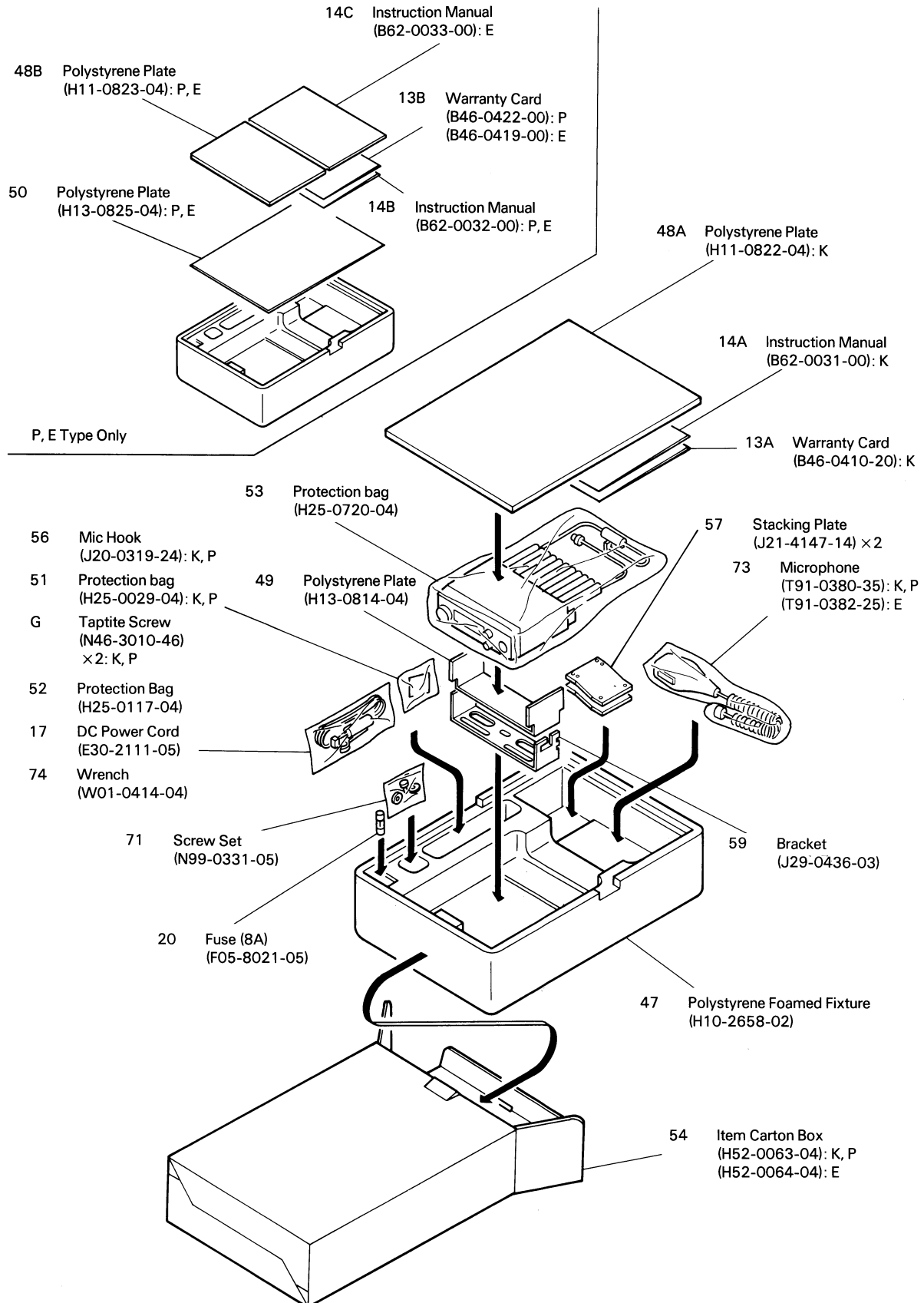
TM-541A: K, P

TM-541E: E

Parts with the exploded numbers larger than 700 are not supplied.



PACKING



ADJUSTMENT

REQUIRED TEST EQUIPMENT

1. DC V.M and Tester

- 1) High input impedance

2. RF VTVM (RF V.M)

- 1) Input impedance : $1M\Omega$ min., $2pF$ max.
- 2) Voltage range : F.S = 10mV to 300V
- 3) Frequency range: Up to 1200MHz

3. Frequency Counter (f. counter)

- 1) Input sensitivity : Approx. 50mV
- 2) Frequency range: Up to 1200 MHz

4. DC Power Supply

- 1) Voltage : 10V to 17V, variable
- 2) Current 10A min.

5. Power Meter

- 1) Measurement range : Approx. 30W, 3W, 1W
- 2) Input impedance : 50Ω
- 3) Frequency range: 1200 MHz

6. AF VTVM (AF V.M)

- 1) Input impedance : $1M\Omega$ min.
- 2) Voltage range : F.S = 1mV to 30V
- 3) Frequency range : 50Hz to 10kHz

7. AF Generator (AG)

- 1) Output frequency : 100Hz to 10kHz
- 2) Output voltage : 0.5mV to 1V

8. Linear Detector

- 1) Frequency range: 1200 MHz

9. Spectrum Analyzer

- 1) Frequency range: 1200 MHz

10. Directional Coupler

11. Oscilloscope

- 1) High sensitivity oscilloscope with horizontal input terminal

12. SSG

- 1) Frequency range: 1200MHz band
- 2) Modulation: AM and FM MOD.
- 3) Output level : $0.1\mu V$ to 100mV.

13. Dummy Load

- 1) 8Ω , 5W (approx.)

14. Noise Generator

- 1) Must generate ignition-like noise containing harmonics beyond 1200 MHz

15. Sweep Generator

- 1) Sweep range: 1200 MHz bands

16. Tracking Generator

PREPARATION

- 1) Unless otherwise specified, knobs and switches should be set as follows **Table 8**.

POWER SW	ON	CALL	OFF
AF VOL VR	MIN	BELL/ALERT	OFF
SQL VOL VR	MIN	TONE/T. SHIFT	OFF
VFO	VFO	REV/STEP	OFF
MR	OFF	DR/DT	OFF

Table 8

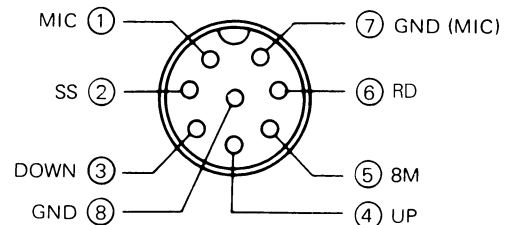


Fig. 17 MIC terminals (view from front panel side)

- 2) Use an insulated adjusting rod to adjust trimmers and coils.
- 3) To prevent damaging SSG, never set the stand by switch to SEND while adjusting the receiver section.
- 4) Be sure to turn the power switch OFF, before connecting the power cable to a power source.
- 5) Meter and display section should be set as follows

Fig. 18.

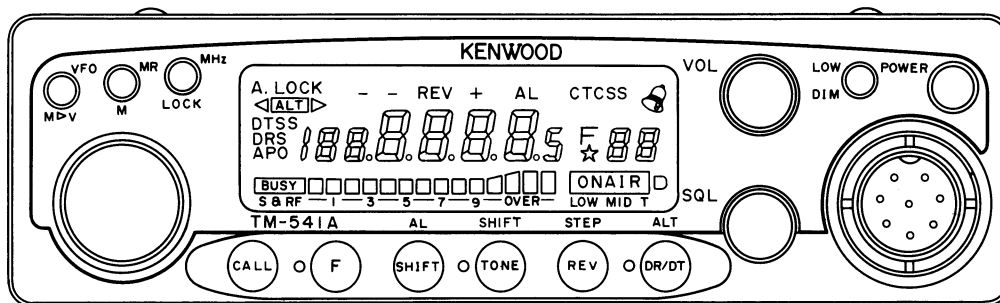


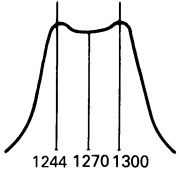
Fig. 18

ADJUSTMENT

COMMON SECTION ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Source voltage: DC 13.8 V POWER SW: ON VOL VR: Full counter-clockwise (CCW) SQL VR: Full counter-clockwise (CCW) TX-RX unit VR4: CCW LOW SW: ON							
2. Reset	1) Turn POWER SW ON while holding down MR/M POWER SW: ON							1240.000 MHz
3. PLL	1) TX VCO FREQ.: 1299.975 MHz Transmit	DVM Power-meter	TX-RX Rear panel	TP2 ANT			Check	6.5~7.3 V
	2) RX VCO FREQ.: 1240.000 MHz Receive				VCO SUB Unit	TC1	7.1 V	±0.2 V
							Check	1.5 V or more
4. Transmit freq. adjustment	1) FREQ.: 1240.000 MHz Transmit	Freq. counter Power-meter	Rear panel	ANT			Check 1240.000 MHz ±1 kHz	

RECEIVER SECTION ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. Helical	1) FREQ.: 1270.100 MHz Connect the TP2 to GND. 2) Connect the tracking generator to ANT terminal (−40 dBm)	Spectrum analyzer Tracking generator	TX-RX Rear panel	J3 ANT	TX-RX	L1, 2	Check whether required band obtained at max. gain.	
2. GAIN	1) FREQ.: 1270.100 MHz SSG Output: −108 dBm (0.9 μV) MOD: OFF	Tester (DC V)	TX-RX	TP1	TX-RX	L4	Adjust the L4 to max.	
3. Sensitivity	1) FREQ.: 1270.100 MHz SSG Output: −122 dBm (0.18 μV) MOD: 1 kHz DEV: ±3 kHz	AF. VM Oscilloscope Distortion meter	Rear panel	EXT. SP				SINAD 12 dB or more
	2) FREQ.: 1240.100 MHz							
	3) FREQ.: 1299.900 MHz							

ADJUSTMENT

RECEIVER SECTION ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
4. S-meter	1) FREQ.: 1270.100 MHz SSG Output: -94 dBm (4.5 μ V) MOD: 1 kHz DEV: \pm 3 kHz	LCD (S-meter)			TX-RX	VR1	All S-meter segments on (adjust VR1 so that last segment just turns off.)	
	2) SSG Output: -93 dBm (5 μ V)						Check	All S-meter segments on.
	3) SSG Output: OFF							S-meter segments off.
5. ALT. ref. voltage	1) FREQ.: 1270.100 MHz No signal condition	Digital voltmeter	TX-RX ALT module	TP3 TP1	TX-RX	VR2	Adjust same voltage to TP1 and TP2	\pm 0.05 V (ref. voltage 3.0~3.5 V)
6. ALT	1) FREQ.: 1270.100 MHz SSG FREQ.: 1270.106 MHz Output: -113 dBm (0.5 μ V) MOD: 1 kHz DEV: \pm 3 kHz ALT SW: ON	Oscilloscope	Rear panel	EXT. SP			Check	ALT \triangleright lights on. Wave is correct.
	2) SSG FREQ.: 1270.094 MHz ALT SW: OFF							\triangleleft ALT lights on.
7. f (2nd L.OSC)	1) FREQ.: 1270.100 MHz SSG Output: -118 dBm (0.28 μ V) MOD: 1 kHz DEV: \pm 3 kHz	AF. VM Oscilloscope Distortion meter	Rear panel	EXT. SP	TX-RX	L6	MAX. (12 dB SINAD)	
	2) SSG Output: -123 dBm (0.16 μ V) MOD: OFF	Digital voltmeter	ALT module	TP1	TX-RX	L6	Check that same voltage between ALT ON and ALT OFF when off voltage, adjust L6	

TRANSMITTER SECTION ADJUSTMENT

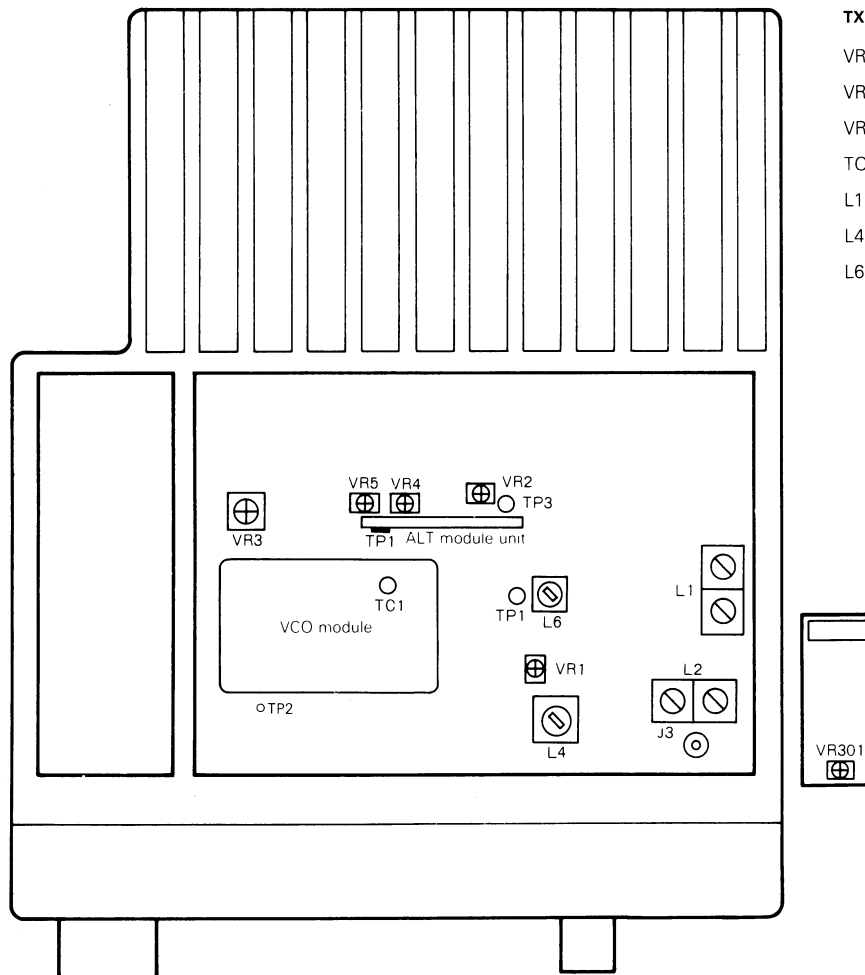
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
1. POWER	1) FREQ.: 1270.000 MHz Transmit	Power meter Ammeter	Rear panel	ANT	TX-RX	VR4	MAX	12 W or more All RF-meter segments on ON AIR indicator on
						VR4	11 W	\pm 1 W 5.5 A or less
						VR5	1 W	\pm 0.2 W, 2.5 A or less 6 digits lights on
	2) LOW SW: ON Transmit				TX-RX			
	3) FREQ.: 1240.000 MHz LOW SW: OFF Transmit						Check	9~14 W 5.5 A or less
	4) FREQ.: 1299.980 MHz Transmit							

ADJUSTMENT

TRANSMITTER SECTION ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method	
2. DEV.	1) FREQ.: 1270.000 MHz AG: 1 kHz, 50 mV LOW SW: ON Transmit	Linear detector Oscilloscope Power meter	Rear panel	ANT	TX-RX	VR3	±4.4 kHz (Read higher absolute value) of + or - value	±200 Hz Check for detected wave form
	2) AG: 1 kHz, 5 mV						Check	±3.5~5.5 kHz
3-1. TONE (K, P)	1) FREQ.: 1282.200 MHz TONE SW: ON LOW SW: ON Transmit	Linear detector Oscilloscope Power meter	Rear panel	ANT	TX-RX	VR301	DEV. ±800 Hz	±50 Hz
3-2. TONE (E)	FREQ.: 1270.000 MHz LOW SW: ON Transmit						DEV. ±2.5 kHz or more	
4. Protection	1) ANT: Opened FREQ.: 1270.000 MHz FREQ.: 1240.000 MHz FREQ.: 1299.975 MHz Transmit	Ammeter					Check	8 A or less

Adjustment points (Top View)



TX-RX Unit (X57-371X-XX)

VR3: DEV. 1 kHz, 50 mV ±4.4 kHz

VR4: APC

VR1: S-meter

TONE SW (MIC): ON

L1, 2: Helical

L4: GAIN

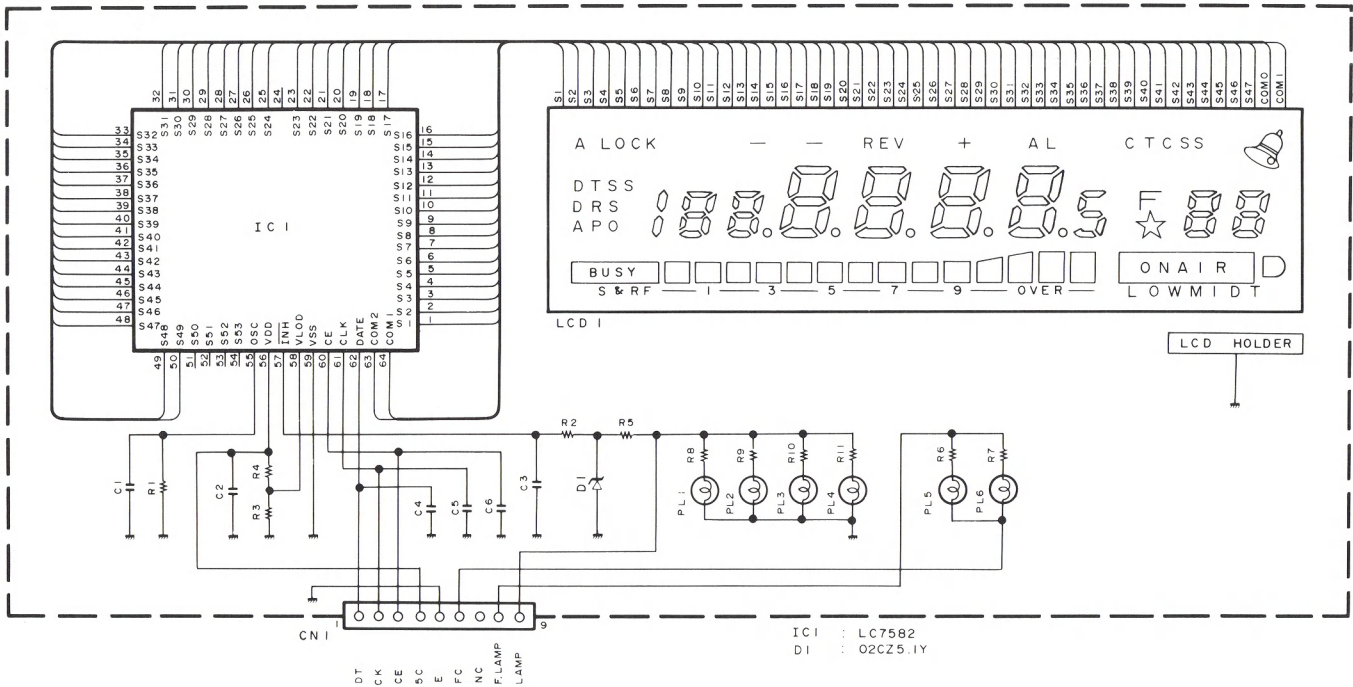
L6: f (2nd OSC)

TM-541A/E

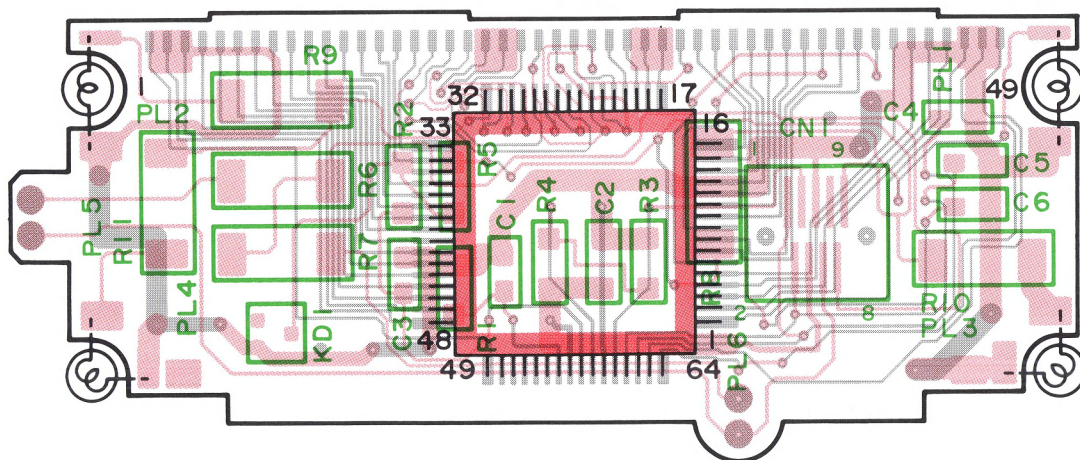
PC BOARD VIEWS/CIRCUIT DIAGRAMS

LCD ASS'Y (B38-0330-05)

LCD ASS'Y (B38-0330-05)



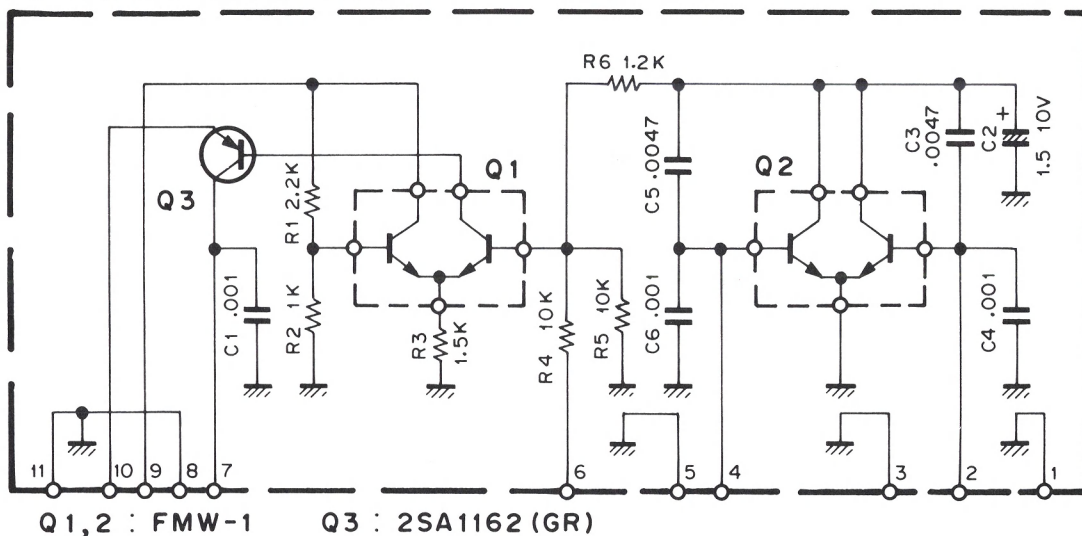
LCD ASS'Y (B38-0330-05) Component side view



PC BOARD VIEWS/CIRCUIT DIAGRAMS

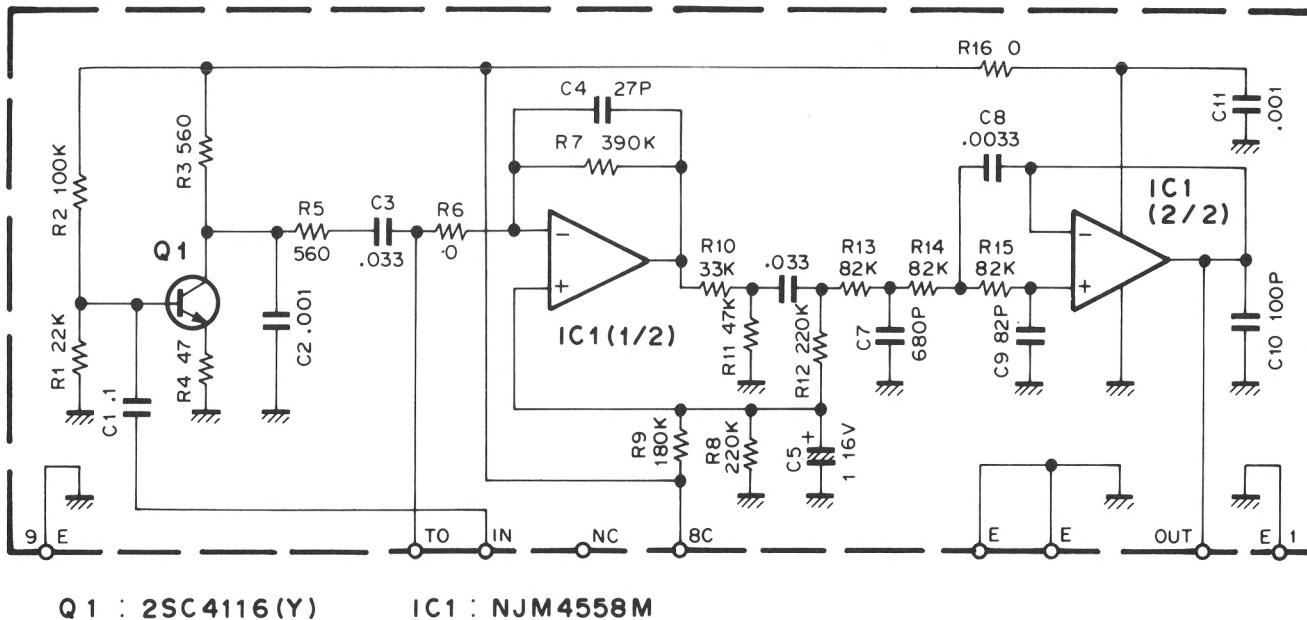
▼APC(X59-3130-00)

APC (X59-3130-00)

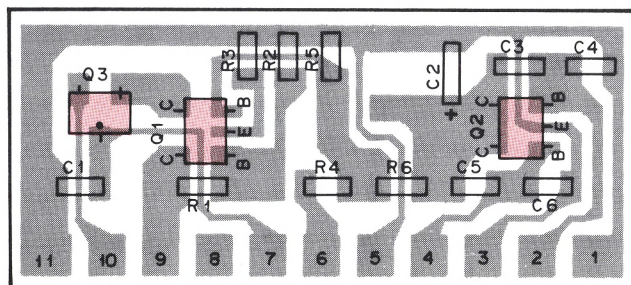


▼MIC AMP(X59-3610-00)

MIC AMP (X59-3610-00)



APC (X59-3130-00) Component side view

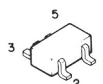


Q1,2 : FMW-1 Q3 : 2SA1162 (GR)

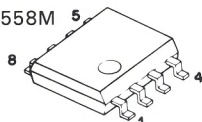
2SA1162



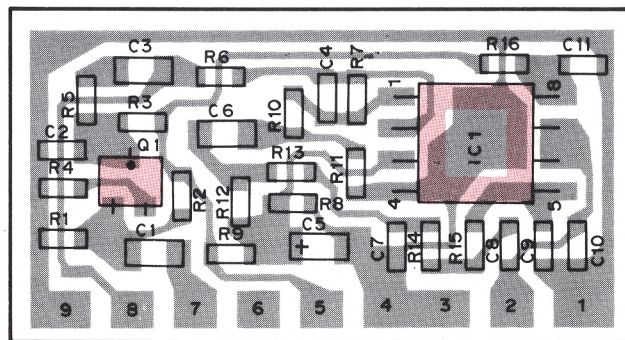
FMW1



NJM4558M



MIC AMP (X59-3610-00) Foil side view

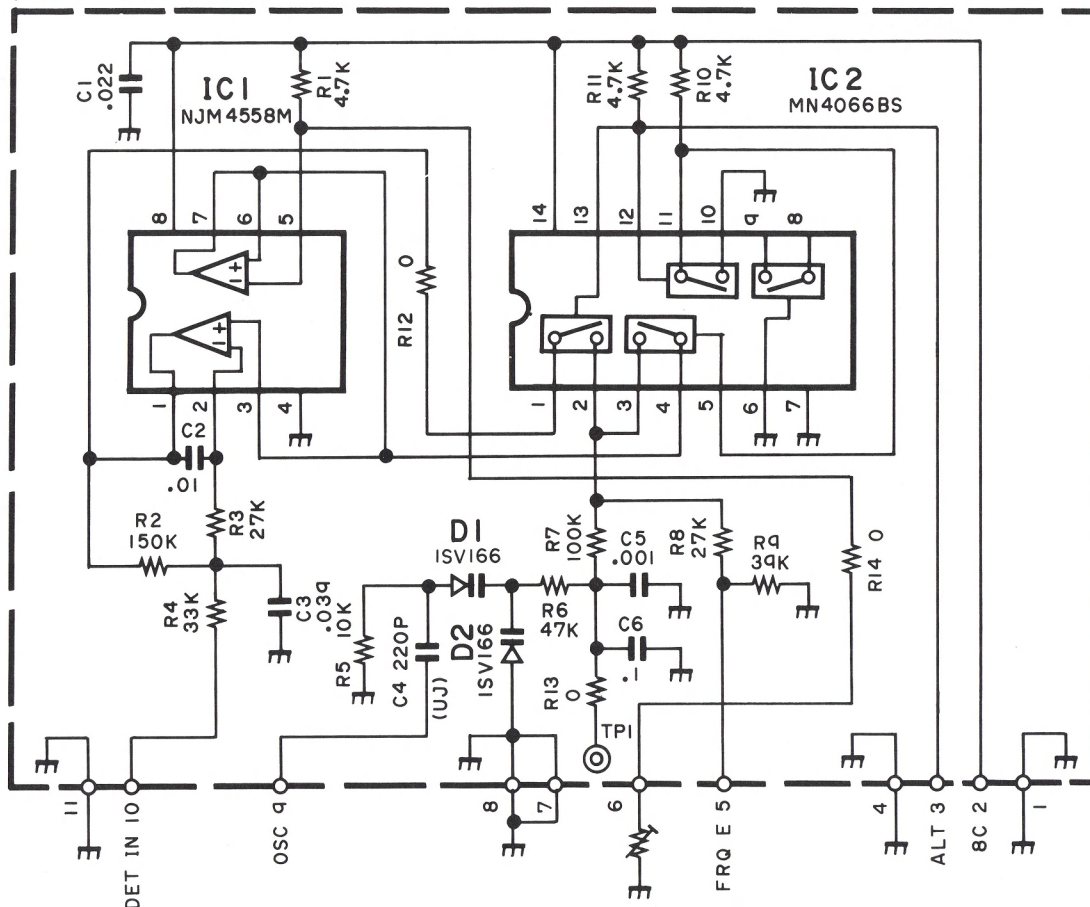


Q1 : 2SC4116 (Y) IC1 : NJM4558M

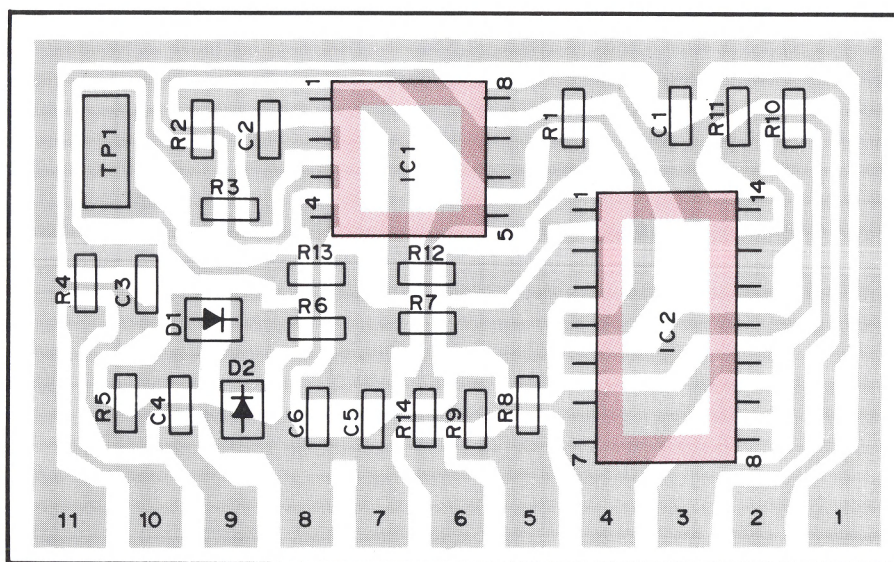
TM-541A/E

PC BOARD VIEWS/CIRCUIT DIAGRAMS

▼ ALT (X59-3510-00)
(X59-3510-00)

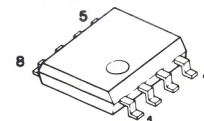


▼ ALT (X59-3510-00) Foil side view

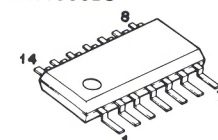


IC1: NJM4558M IC2: MN4066BS

NJM4558M

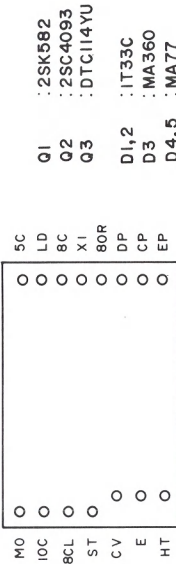
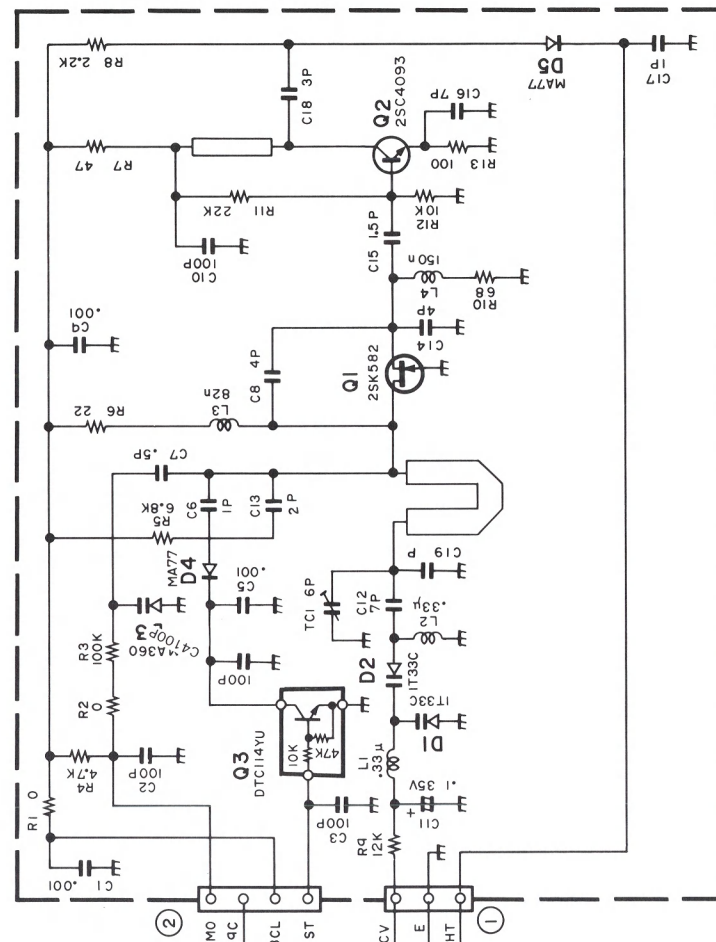


MN4066BS

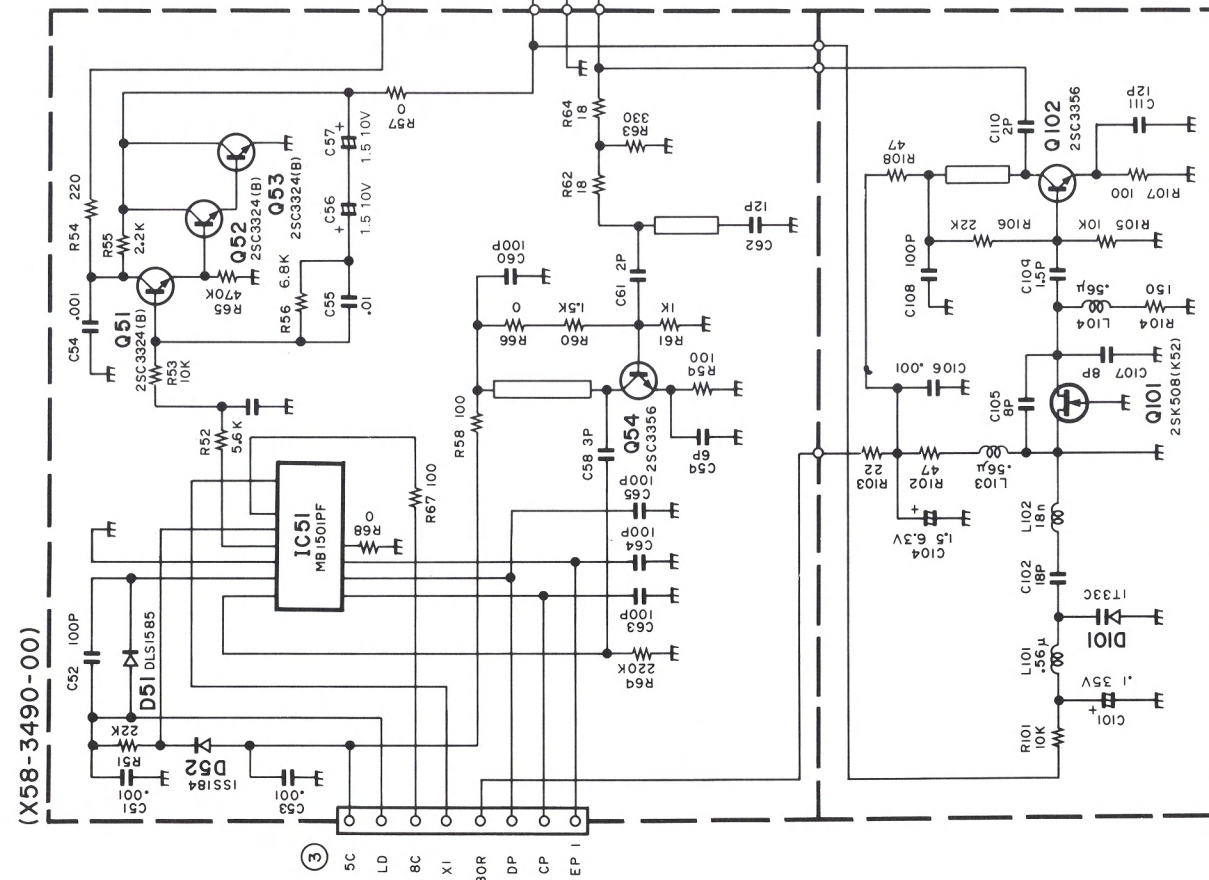


CIRCUIT DESCRIPTION

▼PLL(X58-3490-00)

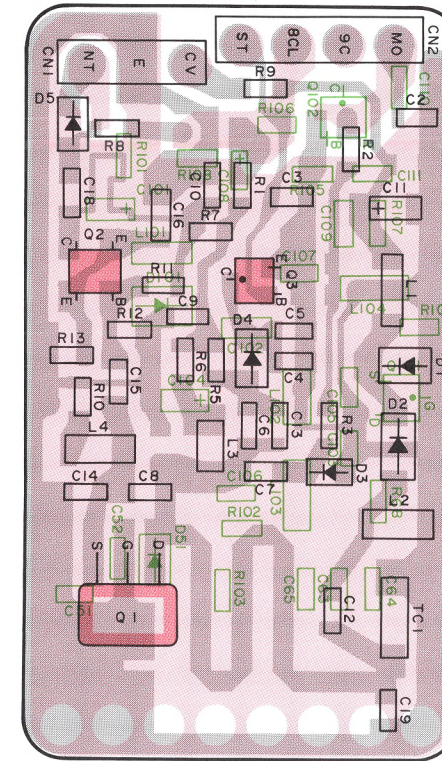


TM-541



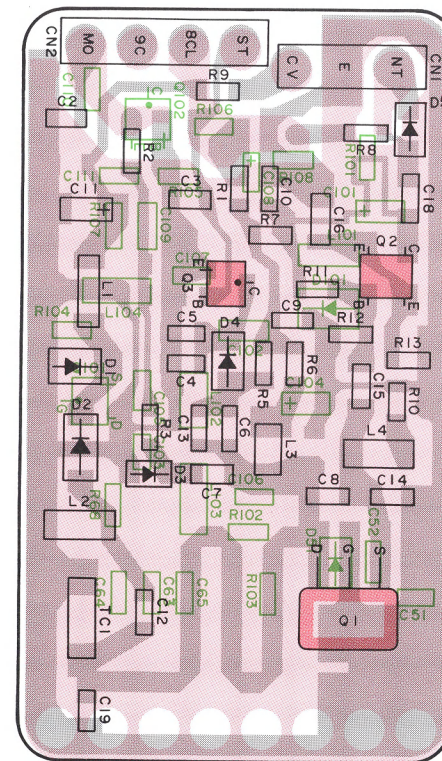
▼PLL(X58-3490-00)(A/2)

Component side view



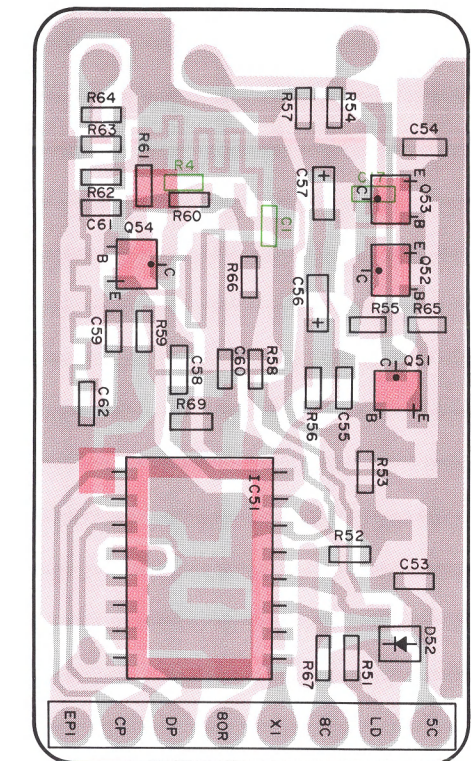
▼PLL(X58-3490-00)(A/2)

Foil side view



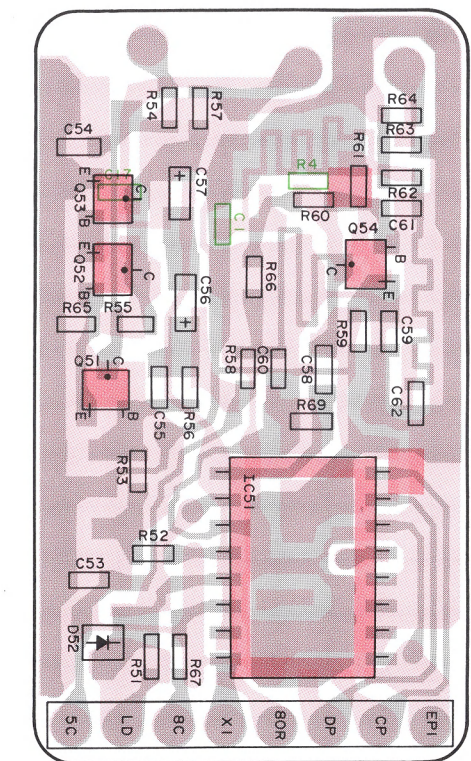
▼PLL(X58-3490-00)(B/2)

Component side view



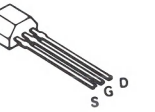
▼PLL(X58-3490-00)(B/2)

Foil side view

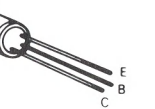


IC51:MB1501PF Q1:2SK582 Q2:2SC4093 Q3:DTC114YU Q51~53:2SC3324(B)
Q54:2SC3356 Q101:2SK508(K52) Q102:2SC3356

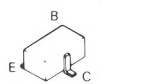
2SK582



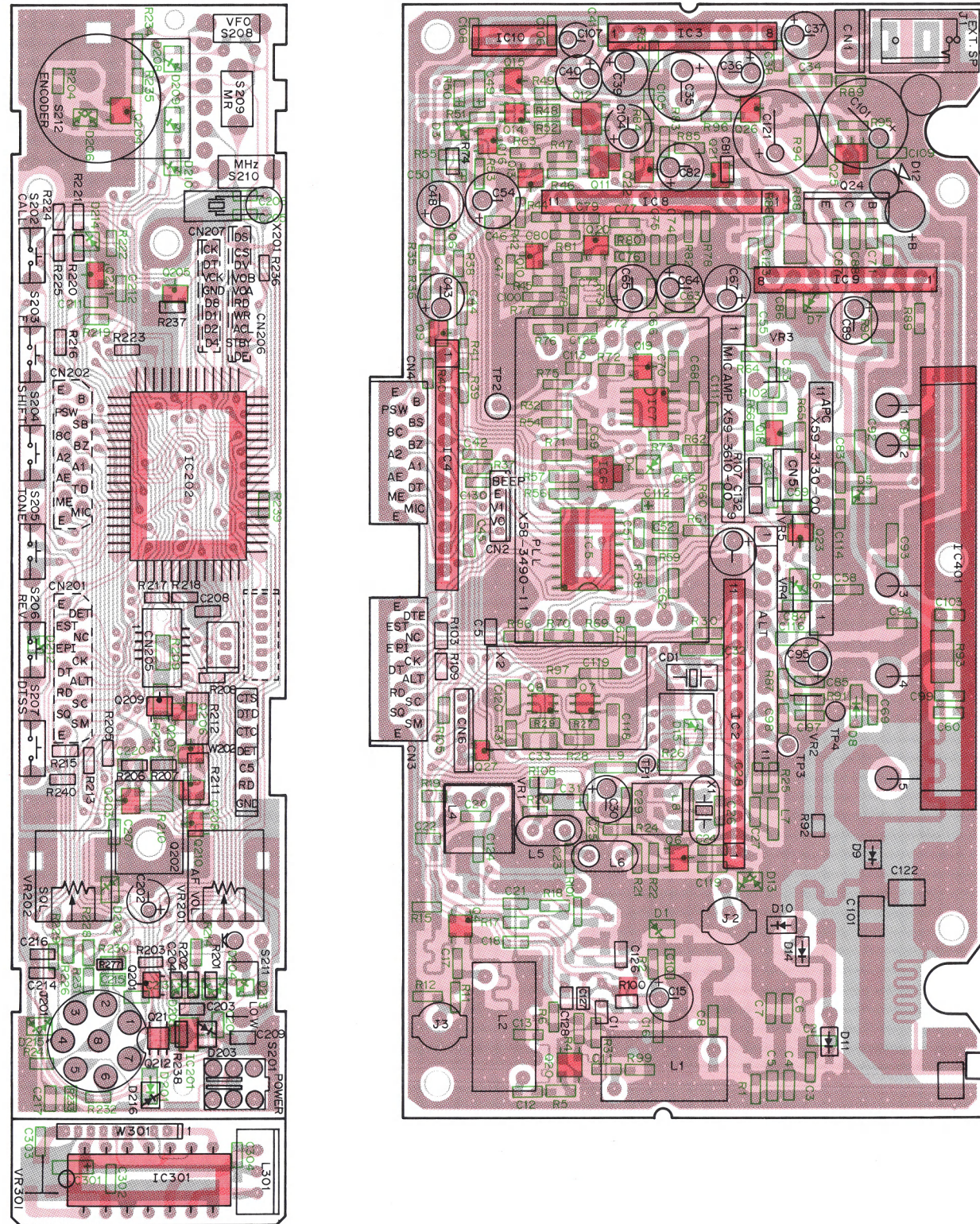
2SC4093



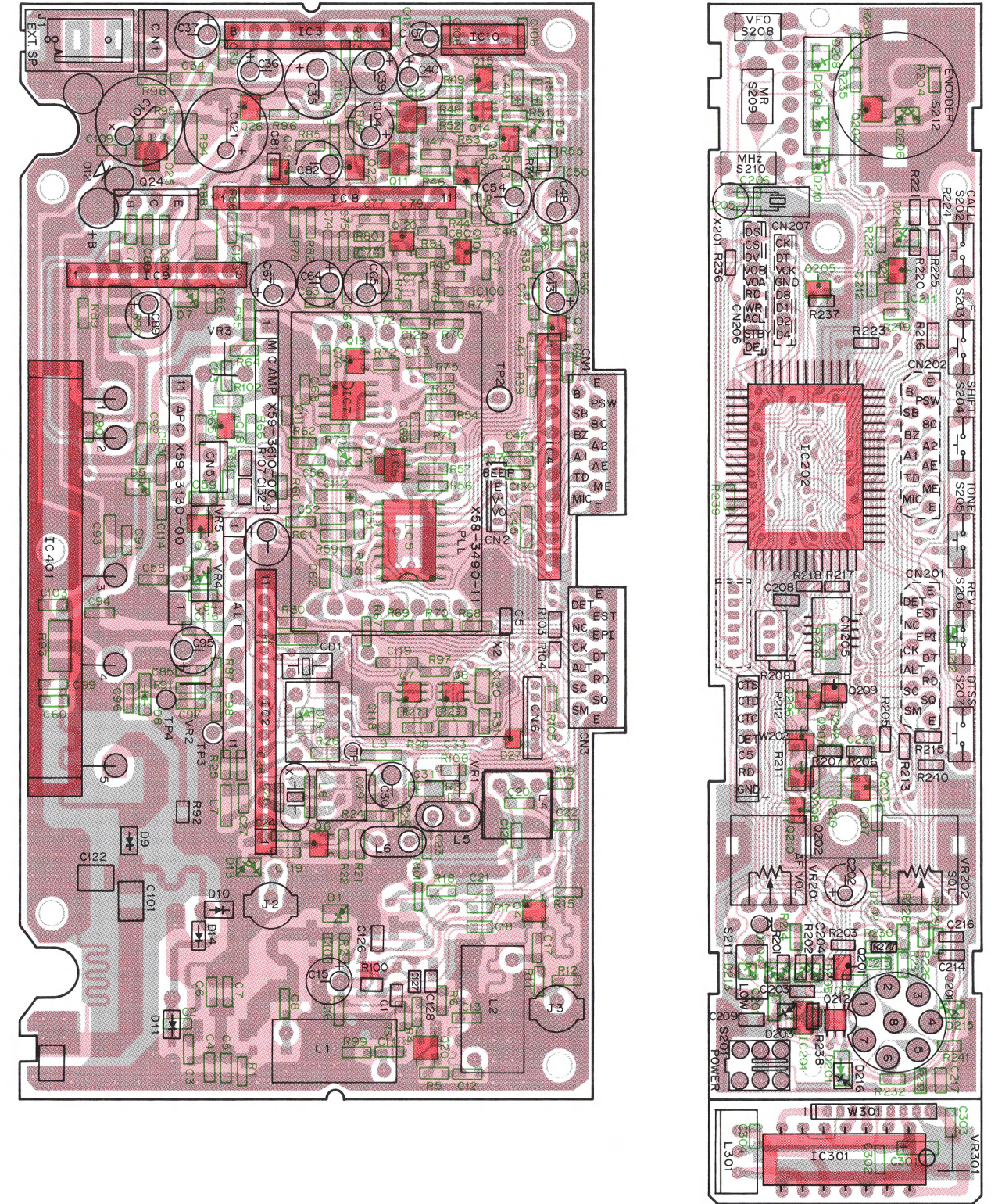
DTC114YU
2SC3324
2SC3356



▼ TX-RX UNIT (X57-371XX-XX) Component side view



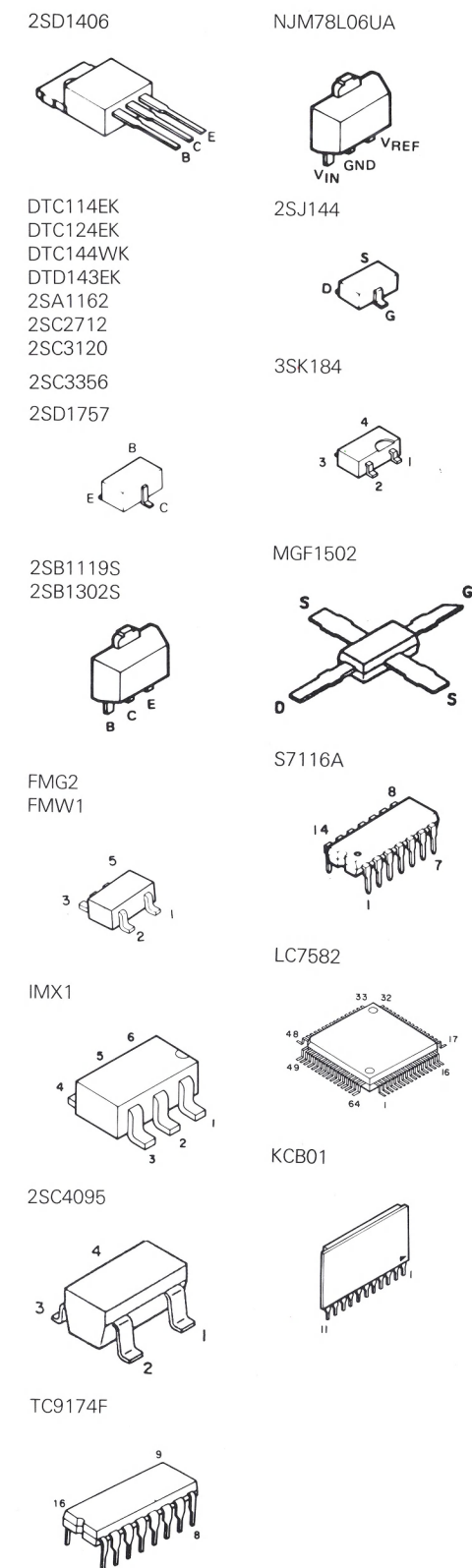
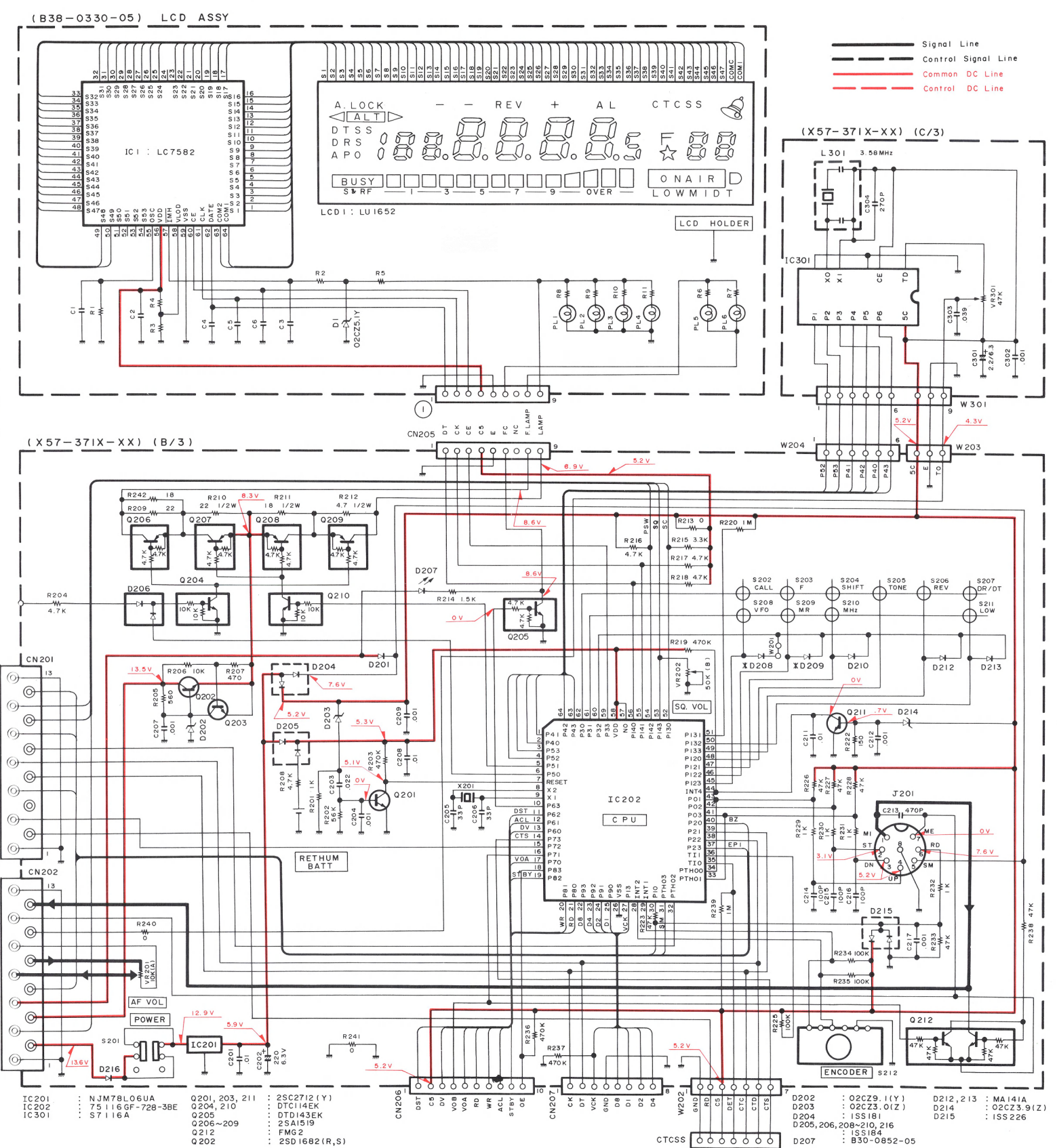
▼ TX-RX UNIT (X57-371X-XX) Foil side view



IC1:LC7582 IC2:KCD04 IC3:UPC1241H IC4:KCC02 IC5:IC9174F IC6:NJM78L05UA IC7:LA5009M IC8:KCB01 IC9:KCB07 IC10:MC7808CT
IC201:N5M78L06UA

IC202:75116GF-728-3BE IC301:S7116A IC401:M67711 Q1:MGF1502 Q2:2SC4095(R47.6) Q4:3SK184(R) Q6:2SC3120
Q7:FMG2 Q8:IMXI Q9:2SD1757(K) Q10:2SC3356 Q11:2SB1119S Q12:2SB1302S Q13:DTC144WK Q14:FMWI Q15,16:2SC2712(Y)

Q18:2SD1757(K) Q19:2SC2712(Y) Q20:2SC3356 Q21:DTC124EK Q22:2SA1162(Y) Q23:DTC114EK Q24:2SD1406(Y)
Q25:2SB1302S Q26:2SC2712(Y) Q201:2SC2712(Y) Q202:2SD1682(R,S) Q203:2SC1712(Y) Q204:DTC114EK
Q205:DTD114EK Q206~209:2SA1519 Q210:DTC114EK Q211:2SC2712(Y) Q212:FMG2



TM-541A/E TM-541A/E TM-541A/E TM-541A/E

LEVEL DIAGRAM

BLOCK DIAGRAM

Receiver Section

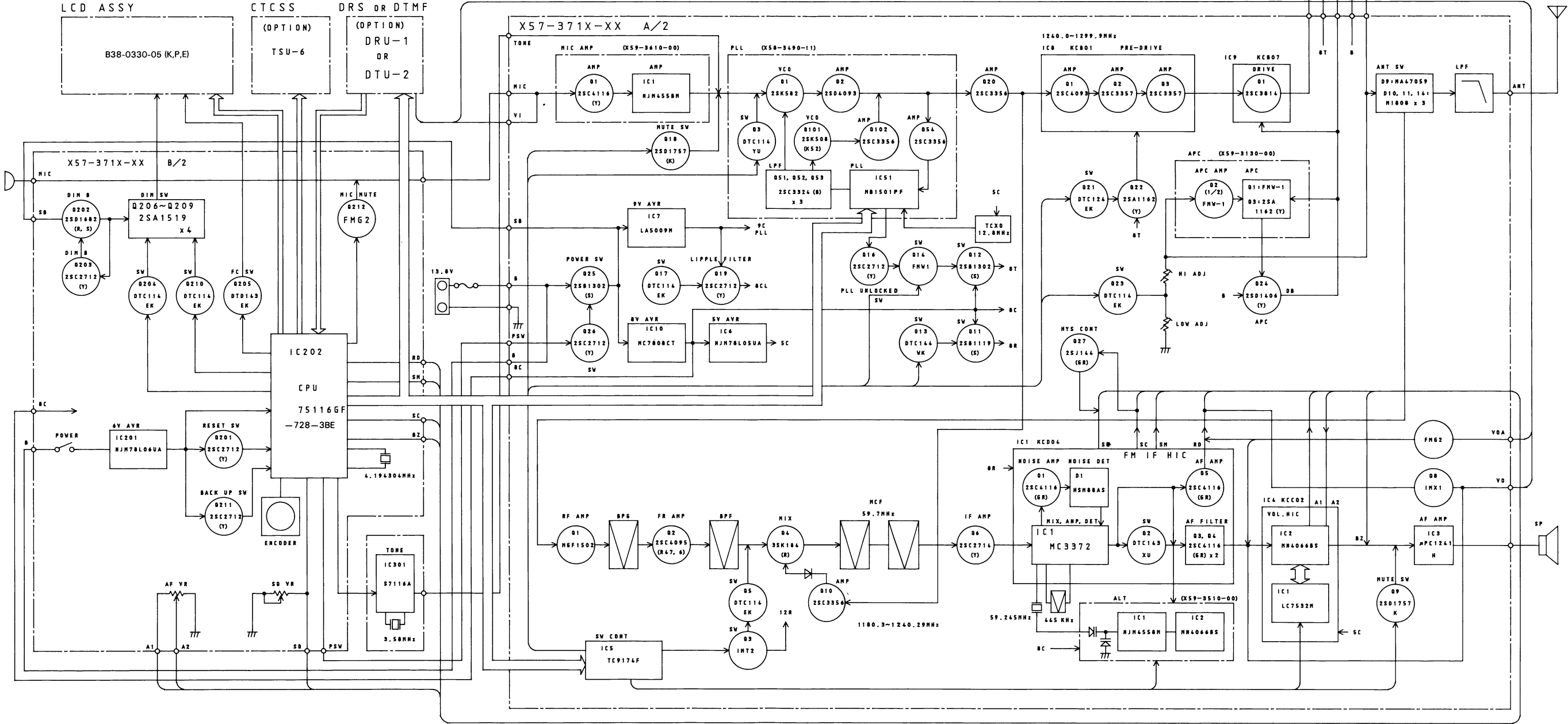
Transmitter Section

1. AG is set so that MIC input becomes 3 kHz DEV at 1 kHz MOD.

2. Transmitting frequency: 1280.00 MHz.

Connector No.	Terminal No.	Terminal Name	Terminal Function
TX-RX UNIT (X57-371X-XX) (A/3)			
CN1	1	E	GND.
	2	SP	Speaker input.
CN2	1	BZZ	GND.
	2	E	Voice memory input.
	3	VI	Voice memory output.
	4	VO	Voice supply for voice memory.
	5	VOA	Voice supply for voice memory.
CN3	1	E	GND.
	2	DET	CTCSS detection output.
	3	ES2	Shift register (IC5) enable.
	4	NC	PLL enable.
	5	EP1	PLL clock.
	6	CK	PLL data.
	7	DT	F. Err output.
	8	ALT	Audio output.
	9	RD	Squelch busy control output.
	10	SC	Squelch output.
	11	SQ	S-meter output.
	12	SM	GND.
	13	E	GND.
CN4	1	E	GND.
	2	B	+13.8 V.
	3	PSW	Power switch-control input.
	4	SB	Switched B.
	5	8C	Common +8V.
	6	BZ	Beep input (To AF IC from CPU).
	7	A2	Audio input (To electronic volume from AF VOL).
	8	A1	Audio output (To AF VOL).
	9	E	GND.
	10	TO	Tone input.
	11	ME	MIC GND.
	12	MIC	Mic input (To MIC AMP unit).
	13	E	GND.
TX-RX UNIT (X57-371X-XX) (B/3)			
CN201	1	E	GND.
	2	DET	CTCSS detection output.
	3	ES2	Shift register enable (From CPU IC202).
	4	NC	PLL enable (From CPU IC202).
	5	EP1	PLL clock (From CPU IC202).
	6	CK	PLL data (From CPU IC202).
	7	DT	F. Err input.
	8	ALT	Audio input (CPU IC202).
	9	RD	Squelch busy control input.
	10	SC	Squelch input (To CPU IC202).
	11	SQ	S-meter input (To CPU IC202).
	12	SM	GND.
	13	E	GND.

Connector No.	Terminal No.	Terminal Name	Terminal Function
CN202	1	E	GND.
	2	B	+13.8V.
	3	PSW	Power switch control input.
	4	SB	Switched B.
	5	8C	Common +8V.
	6	BZ	Beep input (To AF IC from CPU).
	7	A2	Audio output (To electronic volume from AF VOL).
	8	A1	Audio output (To AF VOL).
	9	AE	GND.
	10	TO	Tone input.
	11	ME	MIC GND.
	12	MIC	Mic input (To MIC AMP unit).
	13	E	GND.
CN207	1	CK	PLL IC clock output (From CPU P21).
	2	DT	PLL IC data output (From CPU P22).
	3	VCK	GND.
	4	GND	DRS unit data.
	5	8D	DRS unit data.
	6	D1	DRS unit data.
	7	D2	DRS unit data.
	8	D4	DRS unit data.
CN206	1	DST	Common +5V.
	2	C5	DRS unit VOB output.
	3	DV	DRS unit VOA output.
	4	VOB	DRS unit RD output.
	5	VOA	DRS unit WR output.
	6	RD	DRS unit RESET output.
	7	WR	DRS unit STBY output.
	8	ACL	DRS unit STBY output.
	9	STBY	DRS unit STBY output.
	10	OE	DRS unit STBY output.
CN205	1	DT	LCD driver data output.
	2	CK	LCD driver clock output.
	3	CE	LCD driver enable output.
	4	C5	Common +5V.
	5	E	GND.
	6	FC	Function control.
	7	NC	Function lamp B.
	8	F.LAMP	Lamp B.
	9	LAMP	Lamp B.
W203	1	5C	+5 V.
	2	E	GND.
	3	TO	Tone output.
W204	1	P1	Tone Frequency output.
	2	P2	Tone Frequency output.
	3	P4	Tone Frequency output.
	4	P5	Tone Frequency output.
	5	P3	Tone Frequency output.
	6	P6	Tone Frequency output.
TX-RX UNIT (X57-371X-XX) (C/3)			
W301	1	P1	Tone Frequency output.
	2	P2	Tone Frequency output.
	3	P4	Tone Frequency output.
	4	P5	Tone Frequency output.
	5	P3	Tone Frequency output.
	6	P6	Tone Frequency output.
	7	5C	+5V.
	8	E	GND.
	9	TO	Tone output.



DRU-1 (DIGITAL RECORDING UNIT)

DRU-1 CIRCUIT DESCRIPTION

1. Overview

The DRU-1 is a digital recording and playback unit designed to be installed inside the TM-541A/E series. This unit has the following features:

- Recording received audio (for output to the internal speaker) or transmit audio (microphone input)
- Outputting recorded audio to the internal speaker or outputting recorded audio as modulating signals during transmission
- Built-in lithium battery back-up for maintaining DRU-1 contents

2. Operations

• Recording received audio (for output to the internal speaker)

A received signal from the VO pin is fed into pin 1 (0Y) of the multiplexer IC1 (TC4052BF). It is then fed into pin 59 (MIC IN) of IC3 (TC8830F) via pin 3 (Y). The signal is amplified approx. 26dB by a mic amplifier in IC3, and output via pin 60 (C1). The signal from pin 60 is fed into pin 63 (C2) and amplified approx. 20dB. The amplified signal is applied to pin 64 (MIC OUT) and pin 65 (ADI).

• Recording transmit audio (microphone input)

Microphone input from the VI pin is amplified by Q5, and fed into pin 2 (2Y) of the multiplexer IC1 (TC4052BF). It is then supplied to IC3 (TC8830F) via pin 3 (Y) and recorded in the same way as in recording received sound.

• Outputting recorded audio to the internal speaker

D/A convertor output from pin 66 (DAO) of IC3 (TC8830F) is passed through a CR filter, and amplified by Q6. The amplified signal is then fed into pin 13 (X) of the multiplexer IC1 (TC4052BF), and output to the VO pin via pin 14 (1X).

• Outputting recorded audio as modulating signals during transmission

When sound recorded in the DRU-1 is played during transmission, the same operations as written above in outputting recorded audio to the internal speaker occur. That is, D/A convertor output from pin 66 (DAO) of IC3 (TC8830F) is passed through a CR filter, amplified by Q6, and fed into pin 13 (X) of the multiplexer IC1 (TC4052BF). The sound, however, is output via pin 11 (3X).

	VOA (pin 10)	VOB (pin 9)	On channel
Output to speaker	H	L	1X (pin 14)
Output during transmission	H	H	3X (pin 11)
Received audio recording	L	L	0Y (pin 1)
Transmit aidop recording	L	H	2Y (pin 2)

Table 1 IC1 : TC4052BF operations

DRU-1 DESCRIPTION OF COMPONENTS

ACCESSORY UNIT (X42-3010-00)

Component	Use/Function	Description
IC1	Multiplexer	See DRU-1 circuit description.
IC3	Audio recording and playback	See DRU-1 semiconductor data.
IC4~7	S-RAM	
Q5	AF amplification	Mic input amplification.
Q6	AF amplification	Playback sound amplification.
D1	Reverse current prevention	
D2	Reverse current prevention	Back-up.

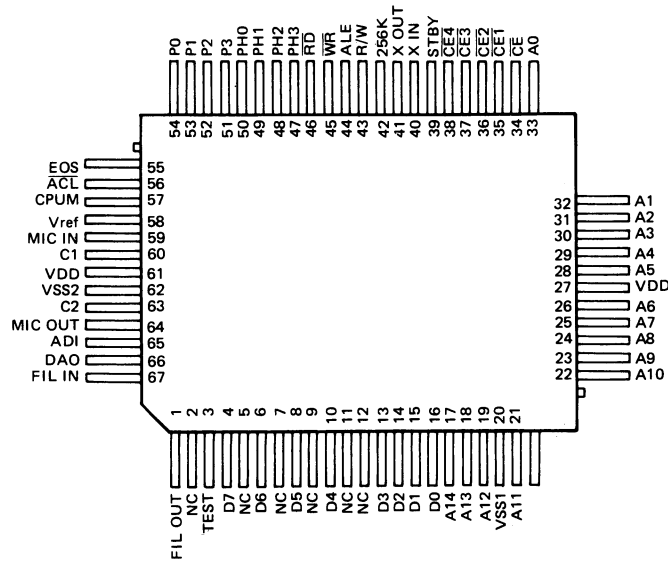
TM-541A/E

DRU-1 (DIGITAL RECORDING UNIT)

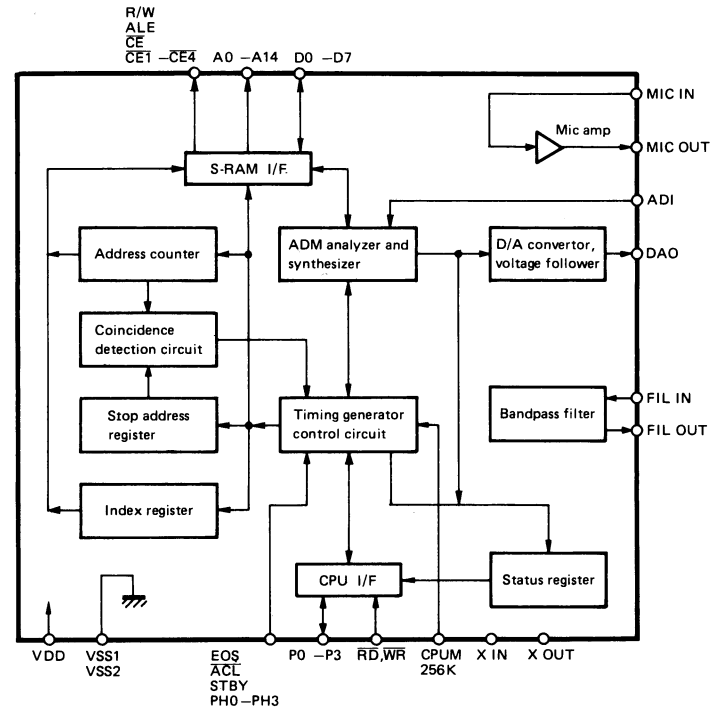
DRU-1 SEMICONDUCTOR DATA

1. Audio recording and playback : TC8830F (IC3)

• Terminal connection diagram



• Block diagram



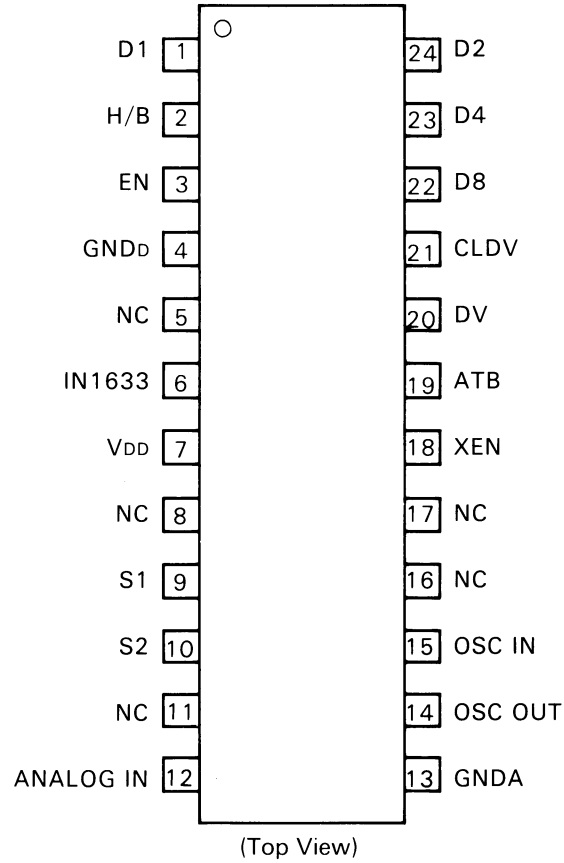
• Terminal functions

Pin No.	Pin name	I/O	Function	Pin No.	Pin name	I/O	Function
1	FIL OUT	O	Not used.	41	X OUT	O	512kHz oscillation circuit.
2	NC	-	Not connected.	42	256K	I	64K/256K RAM select, "H" when 256K used.
3	TEST	-	Not used.	43	R/W	O	RAM read/write output.
4	D7	I/O	RAM data I/O.	44	ALE	-	Not used.
5	NC	-	Not connected.	45	WR	I	Write pulse input.
6	D6	I/O	RAM data I/O.	46	RD	I	Read pulse input.
7	NC	-	Not connected.	47~50	PH3~PH0	-	Not used.
8	D5	I/O	RAM data I/O.	51~54	P3~P0	I/O	Data bus.
9	NC	-	Not connected.	55	EOS	-	Not used.
10	D4	I/O	RAM data I/O.	56	ACL	I	Reset signal input.
11,12	NC	-	Not connected.	57	CPUM	I	"H" when CPU control enabled.
13~16	D3~D0	I/O	RAM data I/O.	58	Vref	O	Analog circuit reference voltage output.
17~19	A14~A12	O	RAM address output.	59	MIC IN	I	Mic amp. 1 input.
20	Vss1	-	GND.	60	C1	O	Mic amp. 1 output.
21~26	A11~A6	O	RAM address output.	61	VDD	-	Power supply.
27	VDD	-	Power supply.	62	Vss2	-	GND.
28~33	A5~A0	O	RAM address output.	63	C2	I	Mic amp. 2 input.
34	CE	-	Not used.	64	MIC OUT	O	Mic amp. 2 output.
35~38	CE1~CE4	O	RAM chip enable.	65	ADI	I	Audio analysis circuit input.
39	STBY	I	Minimum current standby when standby input is "H".	66	DAO	O	D/A convertor output.
40	X IN	I	512kHz oscillation circuit.	67	FIL IN	I	Not used.

DRU-1 (DIGITAL RECORDING UNIT)

2. DTMF DECODER: LR4102N (IC2)

● Pin connection



● Pin description

Pin No.	Name	I/O	Function	Pin No.	Name	I/O	Function
1	D1	O	DTMF data output	13	GNDA	—	Analog GND
2	H/B	I	16 digit cord setting	14	OSC _{OUT}	O	X-tal output
3	EN	I	Output enable	15	OSC _{IN}	I	X-tal input
4	GND _D	—	Digital GND (GND)	16	NC	—	NC
5	NC	—	NC	17	NC	—	NC
6	IN1633	I	Valid 1633 Hz (GND)	18	XEN	I	X-tal enable
7	V _{DD}	—	Power supply	19	ATB	O	NC
8	NC	—	NC	20	DV	O	Data varied
9	S1	—	Bypass (Connected to ground by a 0.01 μF capacitor.)	21	CLDV	I	Data varied clear
10	S2	—	Bypass (Connected to ground by a 0.01 μF capacitor.)	22	D8	O	DTMF data output
11	NC	—	NC	23	D4	O	DTMF data output
12	ANALOG IN	I	DTMF signal input	24	D2	O	DTMF data output

DRU-1 (DIGITAL RECORDING UNIT)

※ New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Telle ohne Parts No. werden nicht geliefert.

DRU-1 PARTS LIST

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
DRU-1						
-			B42-3317-04 B50-8290-00	LABEL INSTRUCTION MANUAL		
			G10-0666-04 G10-0679-04 G13-0913-04	NON-WOVEN FABRIC NON-WOVEN FABRIC FORMED PLATE		
-			H01-8249-03	ITEM CARTON BOX		
-			H03-2772-04	OUTER PACKING CASE		
-			H21-0704-04	PROTECTION SHEET		
-			H25-0029-04	PROTECTION BAG		
-			H25-0710-04	PROTECTION BAG		
			N87-2606-46	BRAZIER HEAD TAPTITE SCREW		
			X42-3010-00	ACCESSORY UNIT		
ACCESSORY UNIT (X42-3010-00)						
C1			CK73FB1H103K	CHIP C 0.010UF K		
C2			CK73FB1H102K	CHIP C 1000PF K		
C3			CK73FF1E154Z	CHIP C 0.15UF Z		
C4 -6			CK73FB1H103K	CHIP C 0.010UF K		
C7			CK73EF1C105Z	CHIP C 1.0UF Z		
C8 -10			CK73FB1H103K	CHIP C 0.010UF K		
C11			CK73FF1E104Z	CHIP C 0.10UF Z		
C12			CK73FB1H103K	CHIP C 0.010UF K		
C13 ,14			CK73FB1H102K	CHIP C 1000PF K		
C15			CK73FF1E104Z	CHIP C 0.10UF Z		
C16			CK73FB1H103K	CHIP C 0.010UF K		
C17			CK73FF1E104Z	CHIP C 0.10UF Z		
C19			CK73FB1H103K	CHIP C 0.010UF K		
C20			CK73FB1H102K	CHIP C 1000PF K		
C21 ,22			CC73FSL1H101J	CHIP C 100PF J		
C23			CK73FB1H103K	CHIP C 0.010UF K		
C24			C92-0010-05	CHIP TAN 6.8UF 6.3WV		
C25			CK73EB1H104K	CHIP C 0.10UF K		
C26			CK73FB1H103K	CHIP C 0.010UF K		
C27			CC73FSL1H101J	CHIP C 100PF J		
C28			CK73FF1E104Z	CHIP C 0.10UF Z		
CN1			E40-5207-05	PIN CONNECTOR		
CN2			E40-5206-05	PIN CONNECTOR		
CN3			E40-5181-05	PIN CONNECTOR		
W1			E31-6005-05	CONNECTING WIRE		
W2			E31-6006-05	CONNECTING WIRE		
W3			E31-6007-05	CONNECTING WIRE		
			F20-0520-04	INSULATING BOARD		
			F20-0521-04	INSULATING BOARD		
X1			L77-1398-05	CRYSTAL RESONATOR 3.579545MHZ		
X2			L78-0050-05	RESONATOR 512KHZ		
R1			RK73FB2A103J	CHIP R 10K J 1/10W		
R2			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R3			RK73FB2A103J	CHIP R 10K J 1/10W		
R4			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R5			RK73FB2A102J	CHIP R 1.0K J 1/10W		

DRU-1 (DIGITAL RECORDING UNIT)

※ New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Telle ohne Parts No. werden nicht geliefert.

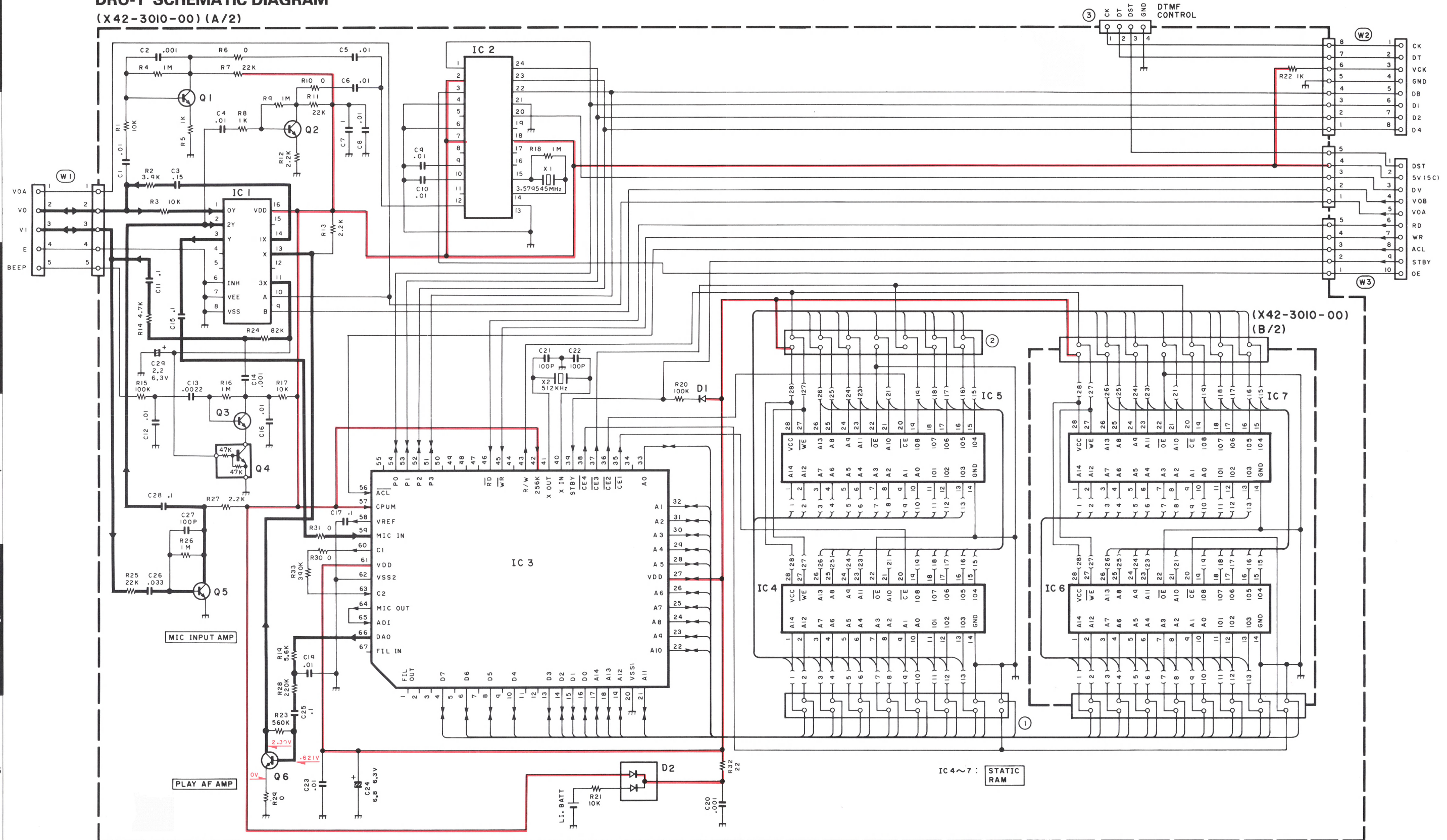
Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R6			R92-0670-05	CHIP R 0 0HM		
R7			RK73FB2A223J	CHIP R 22K J 1/10W		
R8			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R9			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R10			R92-0670-05	CHIP R 0 0HM		
R11			RK73FB2A223J	CHIP R 22K J 1/10W		
R12			R92-0670-05	CHIP R 0 0HM		
R13			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R14			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R15			RK73FB2A104J	CHIP R 100K J 1/10W		
R16			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R17			RK73FB2A103J	CHIP R 10K J 1/10W		
R18			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R19			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R20			RK73FB2A104J	CHIP R 100K J 1/10W		
R21			RK73FB2A103J	CHIP R 10K J 1/10W		
R22			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R23			RK73FB2A564J	CHIP R 560K J 1/10W		
R24			RK73FB2A273J	CHIP R 27K J 1/10W		
R25			RK73FB2A683J	CHIP R 68K J 1/10W		
R26			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R27			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R28			RK73FB2A224J	CHIP R 220K J 1/10W		
R29 -31			R92-0670-05	CHIP R 0 0HM		
R32			RK73FB2A220J	CHIP R 22 J 1/10W		
R33			RK73FB2A394J	CHIP R 390K J 1/10W		
D1 ,2			1SS184	DIODE		
IC1			TC4052BF	IC(4CH MPX/DE-MPX)		
IC2			LR4102N	IC		
IC3			TC8830F	IC		
IC4 -7			HM62256LFP-15T	IC		
Q1 -3			2SC2712(BL)	TRANSISTOR		
Q4			DTC144EK	DIGITAL TRANSISTOR		
Q5 ,6			2SC2712(BL)	TRANSISTOR		
			W09-0326-05	LITHIUM BATTERY		

DRU-1 SCHEMATIC DIAGRAM

TM-541A/E

DRU-1 SCHEMATIC DIAGRAM

(X42-3010-00) (A/2)



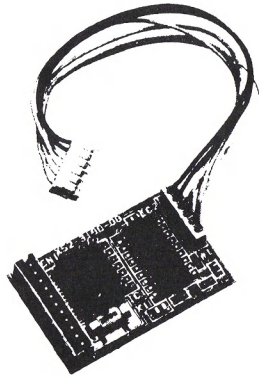
(X42-3010-00) (A/2)

IC 1 : TC4052BF
IC 2 : LR4102N
IC 3 : TC8830F
IC 4~7 : HM62256LFP-15T
Q1~3,5,6 : 2SC2712(BL)
Q4 : DTC144EK
D1, 2 : 1SS184

TM-541A/E

DTU-2 (DTMF UNIT)

DTU-2 EXTERNAL VIEW



DTU-2 PARTS LIST

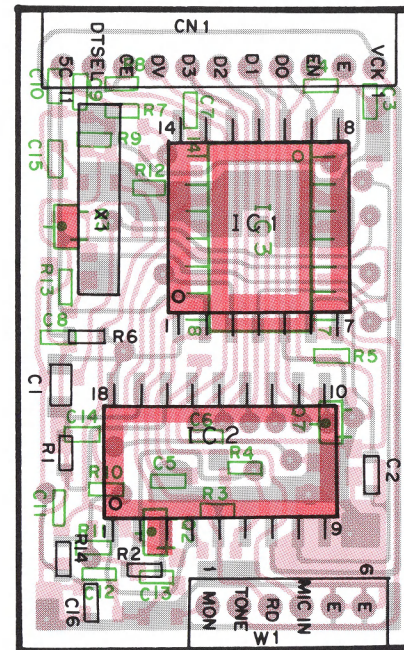
Re 5 No.	New Parts	Parts No.	Description
C1		CK73FB1E104K	Chip C 0.1 μ F K
C2		CC73GCH1H100D	Chip C 10 pF D
C3,4		CC73GCH1H330J	Chip C 33 pF J
C5~8, 10		CK73GB1E103K	Chip C 0.01 μ F K
C13~16		CK73GL1E103K	Chip C 0.01 μ F K
C9		CK73GB1E822K	Chip C 0.0082 μ F K
C10		CK73GB1E322K	Chip C 0.0033 μ F K
C11		CC73GSL1H101J	Chip C 100 pF J
	*	E37-0033-05	Connecting cable (6P)
	*	E40-5188-05	Pin ass'y socket (11P)
X1		L78-0061-05	CERAMIC RESONATOR (3.58 MHz)
R1~14		RK73GB1JxxxJ	Chip R
Q1		DTC114EU	Digial transistor
Q2,3		2SC4116 (Y)	Digital transistor
IC1		TP5088WM	IC
IC2	*	LC7385M	IC
IC3	*	BU4066BF	IC

TM-541A/E

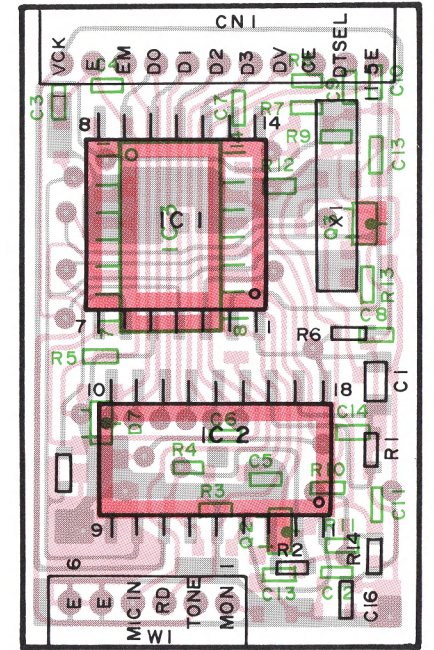
DTU-2 (DTMF UNIT)

DTU-2 PC BOARD

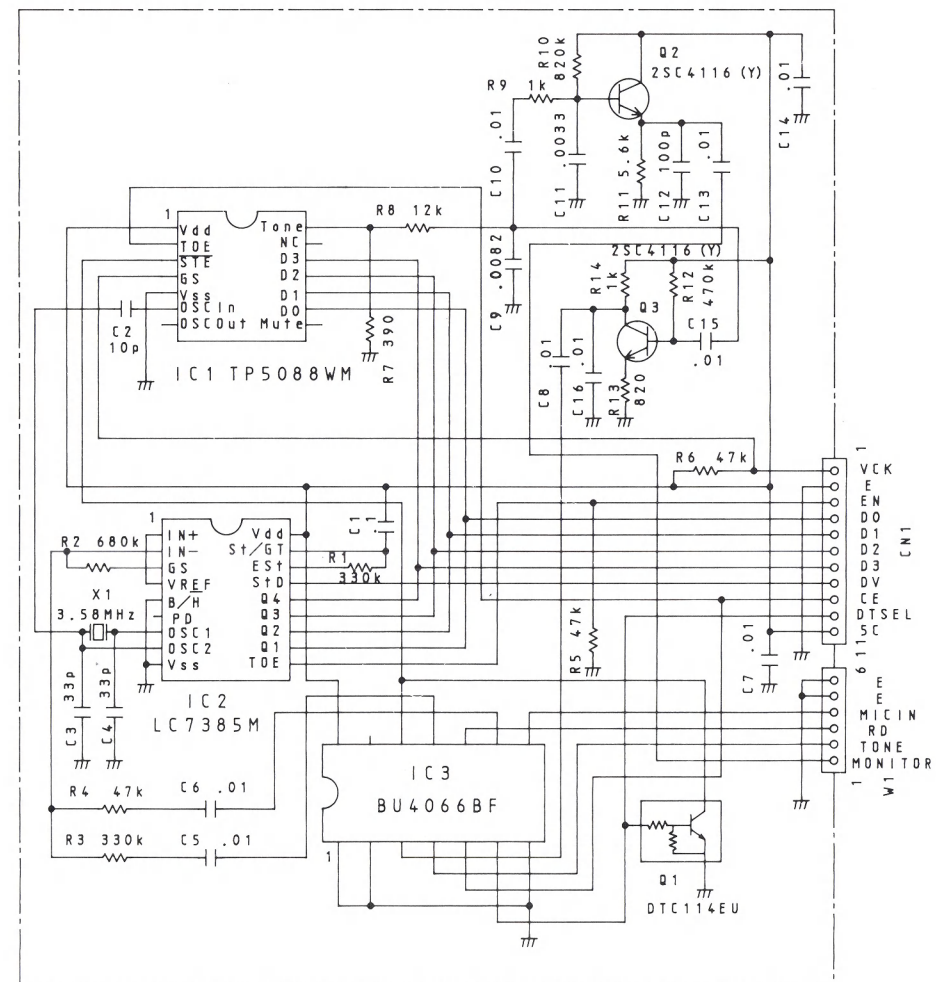
Component side view



Foil side view

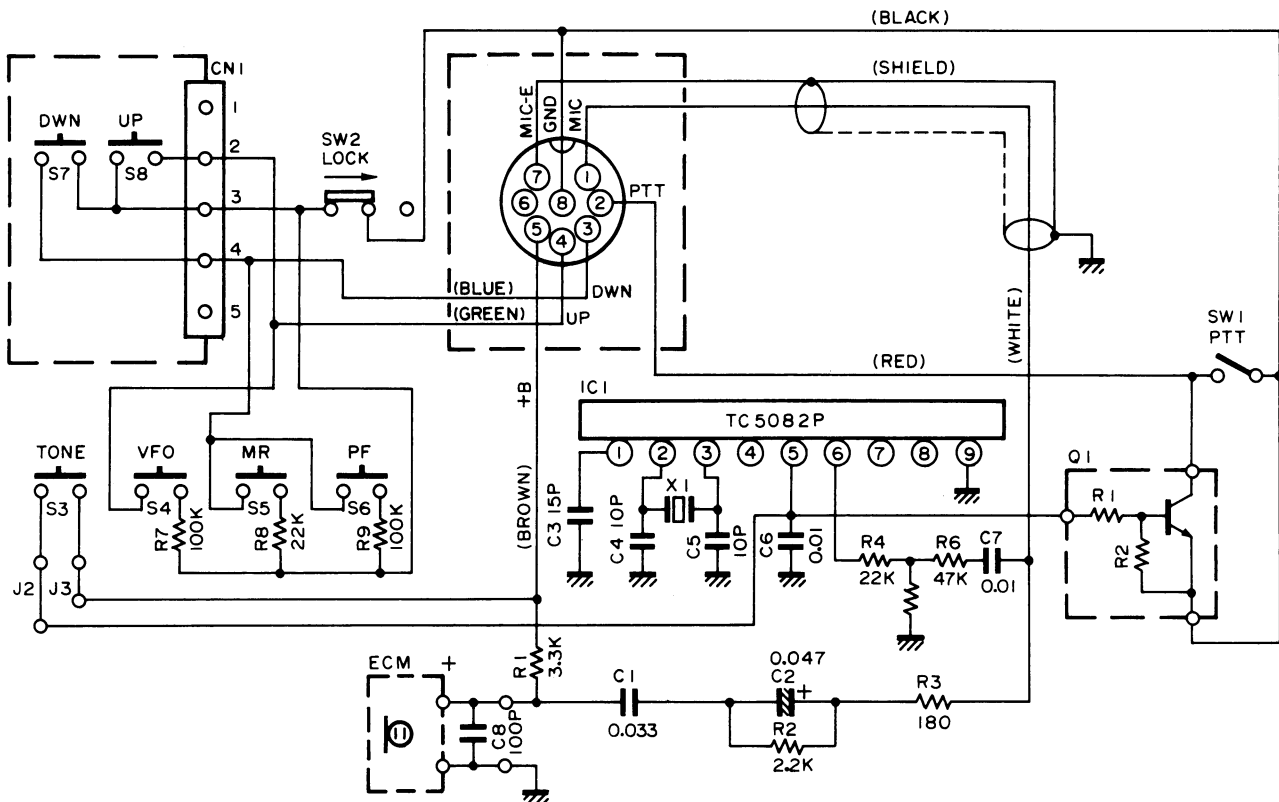


SCHEMATIC DIAGRAM



MC-44E (MULTI FUNCTION MICROPHONE)

MC-44E SCHEMATIC DIAGRAM



MC-44E PARTS LIST

Ref. No.	New parts	Parts No.	Description
		A02-0897-08	Case (Front) With TONE
		A02-0900-08	Case (Rear)
		B50-8293-08	Instruction manual
		E30-2149-08	Curl cord
		K29-3165-08	Knob PTT
		K29-3168-08	Knob UP
		K29-3169-08	Knob DOWN
		K29-3170-08	Knob 1750, VFO, MR, PF
SW2		S31-1422-08	Slide switch LOCK
SW1		S50-1431-08	Micro switch PTT
S7, 8		S59-1409-08	Switch UP, DOWN
		T91-0383-08	Microphone element (Condenser microphone)

(MULTI FUNCTION MICROPHONE WITH AUTOPATCH)

MC-44DM/MC-44DME SCHEMATIC DIAGRAM

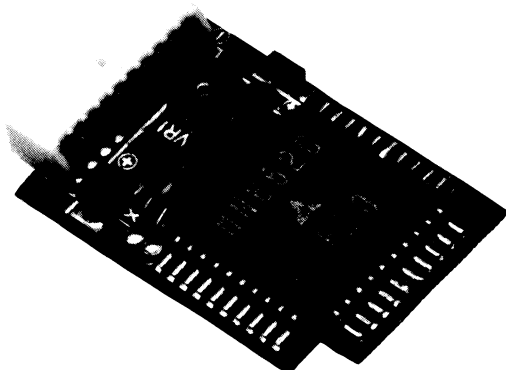


MC-44DM/MC-44DME PARTS LIST

Ref. No.	New parts	Parts No.	Description			
SW2 SW1 S7, 8		A02-0898-08	Case (Front)	DTMF	M W	
		A20-0899-08	Case (Front)	DTMF (With TONE)		
		A02-0901-08	Case (Rear)	DTMF		
		B50-8293-08	Instruction manual			
		E30-2149-08	Curl cord			
		K29-3165-08	Knob	PTT		
		K29-3167-08	Key top	DTMF		
		K29-3168-08	Knob	UP		
		K29-3169-08	Knob	DOWN		
		S31-1422-08	Slide switch	LOCK		
		S50-1431-08	Micro switch	PTT		
		S59-1409-08	Switch	UP, DOWN		
	T91-0383-08	Microphone element (Condenser microphone)				

TSU-6 (CTCSS UNIT)

TSU-6 EXTERNAL VIEW



TSU-6 PARTS LIST

* : New Parts

Ref. No.	New Parts	Parts No.	Description
CTCSS UNIT (X52-3100-00)			
C1		CK73FB1H102K	Chip C 1000pF K
C2		C92-0010-05	Tantal 6.8μF 6.3WV
C3		C92-0006-05	Tantal 3.3μF 4.0WV
C4, 5		CK73EB1E104K	Chip C 0.1μF K
C6		CK73EB1H223K	Chip C 0.022μF K
C7		CK73EB1E104K	Chip C 0.1μF K
C8, 9		CC73FCH1H150J	Chip C 15pF J
C10		CK73FB1H102K	Chip C 1000pF K
C11		CK73EB1E104K	Chip C 0.1μF K
C12		C92-0507-05	Chip tan. 4.7μF 6.3WV
C13		C92-0510-05	Chip tan. 3.3μF 4.0WV
		E40-5121-05	Pin connector (10P)
X1		L77-1313-05	X'tal resonator 4.194304MHz
R1-10		RK73FB2A000J	Chip resistor
R12-14		RK73FB2A000J	Chip resistor
VR1		R12-3460-05	Trimming pot. 33kΩ
Q1		DTC144TK	Digital transistor
Q2		DTA114EK	Digital transistor
Q3		2SC2712(GR)	Chip transistor
IC1		MN6520	IC
IC2		MN4094BS	IC

TSU-6 FINE ADJUSTMENT OF TONE FREQUENCY

The tone frequency can be fine adjusted with an interval of 0.5% step over the range of 0 to +1.5%. Ground the T1 (pin 10) and T2 (pin 9) of IC1 to obtain the desired frequency.

	T1	T2
0%	X	X
+0.5%	○	X
+1.0%	X	○
+1.5%	○	○

○ : GND, X : OPEN

Table 3

TSU-6 REFERENCE DATA

TH-25's condition and MN4094BS (IC2) relationship

CTCSS switch	TONE switch	TX/RX	MN4094BS terminal		
			Q5	Q6	Q1 ~ 4, 7, 8
OFF	OFF	TX	L	H	L
		RX	L	H	L
	ON	TX	L	L	See table 2
		RX	L	H	L
ON	OFF	TX	L	L	See table 2
		RX	H	L	
	ON	TX	L	L	
		RX	H	L	

Q1 ~ 4, 7, 8 : Tone frequency setting

Q5 : TX/RX switch for MN6520 (IC1). "H" : RX, "L" : TX.

Q6 : Power switch for MN6520 (IC1). "H" : OFF, "L" : ON.

Table 1

Tone frequency and MN6520 (IC1) relationship

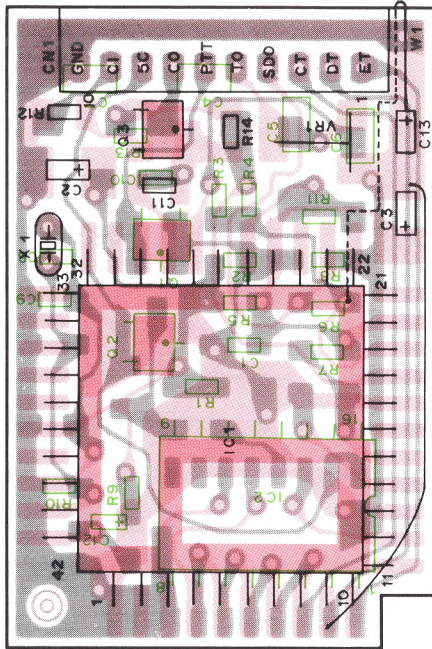
Tone frequency (Hz)	MN6520 terminal					
	S6	S5	S4	S3	S2	S1
	MN4094BS terminal					
	Q1	Q2	Q3	Q4	Q7	Q8
67.0	L	H	H	H	L	H
71.9	L	H	H	H	L	L
74.4	L	H	H	L	H	H
77.0	L	H	H	L	H	L
79.7	L	H	H	L	L	H
82.5	L	H	H	L	L	L
85.4	L	H	L	H	H	H
88.5	L	H	L	H	H	L
91.5	L	H	L	H	L	H
94.8	H	H	H	L	L	H
100.0	H	H	H	L	L	L
103.5	H	H	L	H	H	H
107.2	H	H	L	H	H	L
110.9	H	H	L	H	L	H
114.8	H	H	L	H	L	L
118.8	H	H	L	L	H	H
123.0	H	H	L	L	H	L
127.3	H	H	L	L	L	H
131.8	H	H	L	L	L	L
136.5	H	L	H	H	H	H
141.3	H	L	H	H	H	L
146.2	H	L	H	H	L	H
151.4	H	L	H	H	L	L
156.7	H	L	H	L	H	H
162.2	H	L	H	L	H	L
167.9	H	L	H	L	L	H
173.8	H	L	H	L	L	L
179.9	H	L	L	H	H	H
186.2	H	L	L	H	H	L
192.8	H	L	L	H	L	H
203.5	H	L	L	H	L	L
210.7	H	L	L	L	H	H
218.1	H	L	L	L	H	L
225.7	H	L	L	L	L	H
233.6	H	L	L	L	L	L
241.8	L	H	H	H	H	H
250.3	L	H	H	H	H	L

Table 2

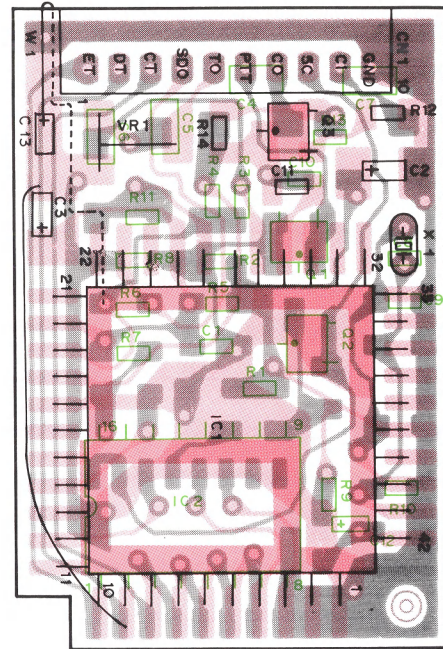
TSU-6 (CTCSS UNIT)

TSU-6 PC BOARD VIEWS

Component side view



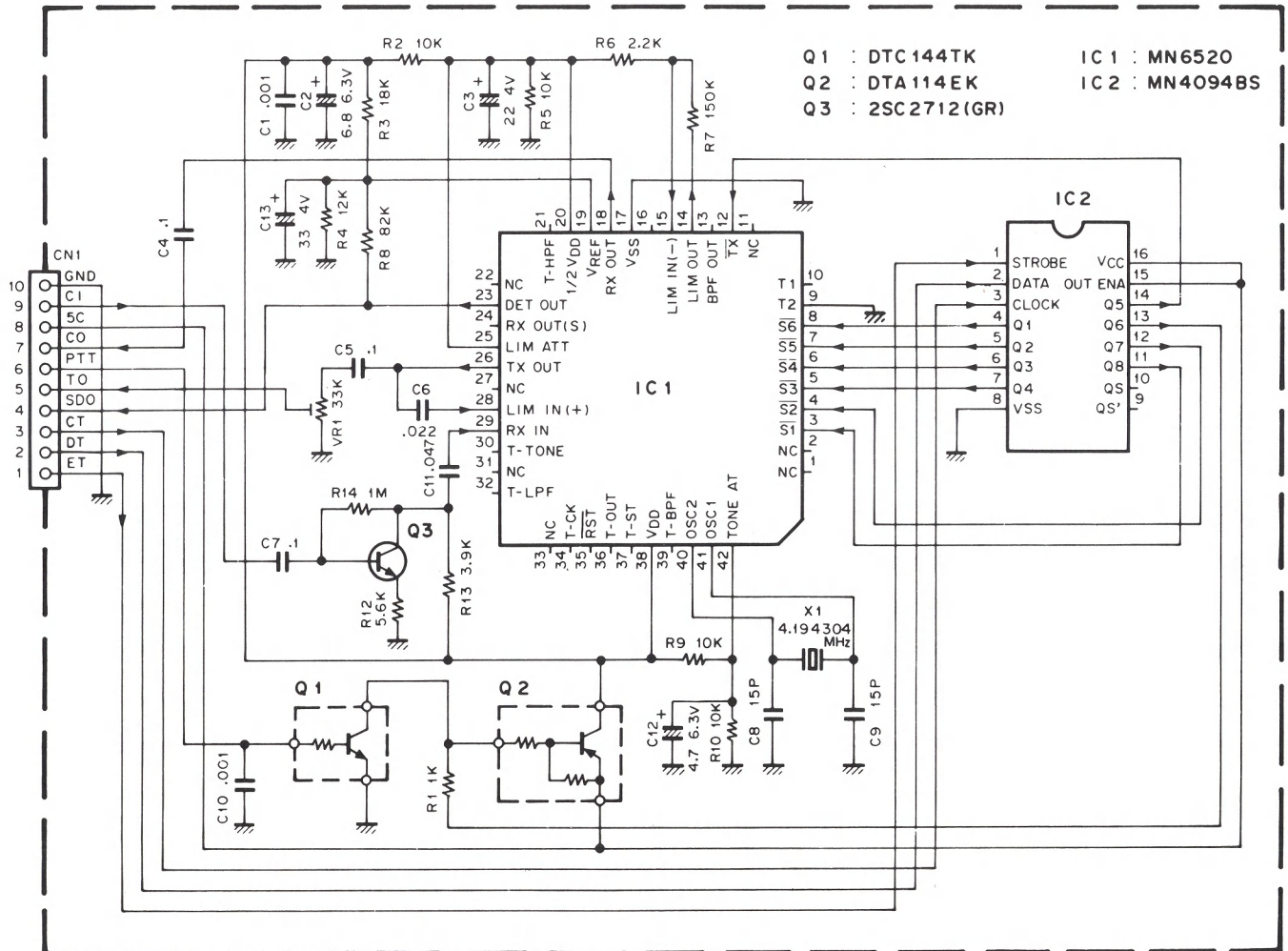
Foil side view



■ : Component side
■ : Foil side

TSU-6 CIRCUIT DIAGRAM

CTCSS UNIT (X52-3100-00)



TM-541A/E

SPECIFICATIONS

TM-541A/TM-541E

General

Frequency range..... 1240 to 1300 MHz
Mode..... F3E (FM)
Antenna impedance..... 50 ohms
Operating temperature..... -20°C to +60°C (-4°F to +140°F)
Power requirement..... 13.8 VDC \pm 15% (11.7 to 15.8)
Grounding..... Negative

Current drain

Transmit mode (Max.)..... Less than 6.0A
Receive mode with no input signal..... Less than 0.6A
Frequency stability..... Less than $\pm 3 \times 10^{-6}$

Dimensions

Wide..... 141 mm (5-9/16")
High..... 42 mm (1-21/32")
Deep..... 171 mm (6-47/64")
Weight..... 1.1 kg (2.65 lbs)

Transmitter

*Output power

HI..... 10 W
LOW..... 1 W

Modulation..... Reactance modulation
Spurious radiation..... Less than -50 dB
Max. frequency deviation..... ± 5 kHz
Audio distortion (at 60% modulation)..... Less than 3% (300 to 3000 Hz)
Microphone impedance..... 500 to 600 ohms

Receiver

Circuitry..... Double conversion superheterodyne
Intermediate frequency

1st..... 59.7 MHz
2nd..... 455 kHz

Sensitivity(12 dB SINAD)..... Less than 0.16 μ V

Selectivity

- 6 dB..... More than 12 kHz
- 60 dB..... Less than 36 kHz

Spurious response..... Better than 40 dB

Squelch sensitivity..... Less than 0.1 μ V

Output (5% distortion)..... More than 2 W across 8 ohms load

External speaker impedance..... 8 ohms

Notes:

1. Circuit and ratings are subject to change without notice due to advancements in technology.

2. * : Recommended duty cycle:
1 minute : Transmission
3 minutes : Reception

KENWOOD CORPORATION

Shionogi Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku, Tokyo 150, Japan

KENWOOD U.S.A. CORPORATION

COMMUNICATIONS & TEST EQUIPMENT GROUP

P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745, U.S.A.

KENWOOD ELECTRONICS DEUTSCHLAND GMBH

Rembrucker Str. 15, 60556 Heusenstamm, West Germany

TRIO-KENWOOD U.K. LIMITED

KENWOOD House, Dwight Road, Watford, Herts, WD1 8EB, United Kingdom

KENWOOD ELECTRONICS BENELUX N.V.

Mechelsesteenweg 418 B-1930 Zaventem, Belgium

TRIO-KENWOOD FRANCE S.A.

13, Boulevard Ney, 75018 Paris, France

KENWOOD LINEAR S.P.A.

20125, Milano-via Arbe, 50, Italy

KENWOOD ELECTRONICS AUSTRALIA PTY. LTD.

P.O. Box 504, 8 Figtree Drive, Australia Centre, Homebush, N.S.W. 2140, Australia

KENWOOD & LEE ELECTRONICS, LTD.

Wang Kee Building, 5th Floor, 34-37, Connaught Road, Central, Hong Kong

KENWOOD ELECTRONICS CANADA INC.

P.O. BOX 1075, 959 Gana Court, Mississauga, Ontario, Canada L4T 4C2